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STATE OF NEW YORK—DEPARTMENT OF AGRICULTURE

REPORT

OF

FARMERS' INSTITUTES

From January 1, 1908, to September 30, 1909

BY

RAYMOND A. PEARSON, Commissioner of Agriculture

TRANSMITTED TO THE LEGISLATURE JANUARY 15, 1910

ALBANY
J. B. LYON COMPANY, PRINTERS
1910

STATE OF NEW YORK

No. 25.

IN ASSEMBLY,

JANUARY 15, 1910.

REPORT OF FARMERS' INSTITUTES

From January 1, 1908, to September 30, 1909

STATE OF NEW YORK:
Department of Agriculture,
Albany, *January* 15, 1910.

To the Legislature of the State of New York:

I have the honor to submit herewith a report of Farmers' Institutes held in New York State from January 1, 1908, to September 30, 1909, which has been prepared under my direction.

RAYMOND A. PEARSON,
Commissioner of Agriculture.

N.Y. dept. of agric. 37-123

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Contents

Page
Introductory Statement 9

Statistics:

Table 1 — Farmers' Institutes and Special Poultry Institutes...... 15
Table 2 — Institute Work, October 1, 1908, to September 30, 1909.. 18
Table 3 — Recapitulation 26
Table 4 — Counties Arranged According to Dates of Regular Institutes 27
Table 5 — Conductors in Charge of Institutes.......................... 28
Table 6 — Speakers at Institutes....................................... 28
Table 7 — Miscellaneous 31

A History of Farmers' Institutes in New York State, by D. P. Witter.... 45

Addresses at the Farmers' Institute School at Alfred:

Social Phases of Agricultural Education, by Dr. Boothe C. Davis...... 63
Land Values and Land Prices in the East and in the West, by G. F. Warren 69

Addresses at the Farmers' Institutes:

The Value of Soil Humus, by John G. Curtis.......................... 87
Drainage, by T. E. Martin.. 91
Feeding Farm Animals, by D. P. Witter................................ 102
The Profitable Cow, by John A. Ennis.................................. 108
Care of the Feet and Teeth of the Horse, by C. W. Brodhead, V. D... 113
Pork Production, by Calvin J. Huson.................................... 120
The Food Value of Milk, Butter and Cheese, by Laura Rose.......... 131
Laws Governing the Potato, by Edward Van Alstyne................ 136
Suggestions from a Practical Experience in Fruit-Growing, by Thomas B. Wilson 148
Pruning and Care of the Orchard, by Fred E. Gott.................. 153
Spraying Mixtures, by Charles M. Day................................ 156
The Farmer's Garden, by John Jeannin, Jr............................ 162
Special Farm Crops, by A. B. Katkamier.............................. 166
Home Sanitation, by Ellis M. Santee, M. D............................ 175
Some Duties of a Patron of Husbandry, by Mrs. S. N. Judd...... 183

Index 193

List of Illustrations

Facing page

FIG. 1.— Early Institute Workers 46
2.— Institute Workers of 1899 50
3.— Institute Workers at the Women's Institute of 1907 50
4.— Map of New York State Showing Institute Districts 54
5.— Farmers' Institute Workers of 1909 58
6.— Land Values and Crop Values per Acre, New York, Illinois and Iowa 70
7.— Greene County 72
8.— Clinton County on Lake Champlain 76
9.— Potato Crop in New York State 144

Introductory Statement

This report covers the period since the close of 1907, the last calendar year reported, to the end of the first fiscal year closed during the present administration, which was September 30, 1909, with the exception of the Normal Institute, held in December, 1908. Report of that meeting constitutes the Farmers' Institute volume of the Department of Agriculture's report to the Legislature of 1909.

Institute meetings of January, February and March, 1908, were under the direction of F. E. Dawley, of Fayetteville. For list of these institutes see Table No. 1. After nearly twelve years of service, Mr. Dawley resigned from the Department on May 30, 1908. Since that time the Commissioner of Agriculture has been in personal charge of the work.

Following the usual custom, practically no institute work was done through the summer of 1908, but during that time a few changes in the method of conducting institutes were adopted. The number of days assigned to each county was made, as nearly as possible, directly proportional to the agricultural interests in that county, as represented by the number of farms. Another innovation, which has proved highly successful, was the holding of county conferences. According to this plan, the chief officer of each agricultural organization and certain other persons, including a representative of the State Department of Agriculture, were called together to recommend places and duration of meetings. Thus institutes were located, after those persons best posted on the agricultural needs and conditions of their respective counties had been consulted.

After January 1, 1909, the institutes were arranged on the district-county plan whereby the State was divided into four districts, each being in charge of a conductor and an assistant. There were also three or four speakers, including a representative of the State Education Department, and usually a woman (Table No. 5). This force permitted the holding of two meetings at the same time in nearby points during much of the season, the conductor in charge of one and the assistant of the other, the speakers being assigned as needed, one speaker often participating in both meetings. The assistant conductor's institute was referred to by the workers as a "lap-over." Institutes were held in remote counties first and the forces worked toward the center of the State, doing all the work in a county, as a rule, on consecutive days (Table No. 4). By this arrangement the saving in transportation alone, as compared with the old plan, is estimated to amount to at least $2,000 annually, besides enabling the speakers to devote much more time to the lecture work. The latter advantage is estimated to be worth as much as the saving in transportation.

Enough of the appropriation for Farmers' Institutes remained at the end of February, 1909, to hold a new kind of meeting to present advanced teaching at three widely separated sections of the State. These meetings were called Institute Schools and were held at Delhi, Delaware County, Alfred, Allegany County, in connection with the State School of Agriculture, and at Spencerport, Monroe County. At each of these meetings, between 9 a. m. and 4.30 p. m., daily lectures on different subjects were given in two, three or more halls at the same hour; also two lectures of general character and wide interest each evening in the main hall. Some lectures were illustrated. Separate sessions conducted by a woman speaker were held for women, while at Delhi there were demonstrations in cooking. Short lectures were given at the public schools. At the three Institute Schools fifty-four speakers were present and two hundred and nineteen lectures delivered. The total attendance, figured on the same basis as for regular institutes, counting those present at one time at each morning, afternoon and evening session, amounted to 9,840, without including the attendance at the special periods in the public schools which amounted to 3,572 (Table No. 2, B and D).

A cooperative institute lasting four days was held at Ithaca in connection with the Farmers' Week at the College of Agriculture. Another was held in connection with the Farmers' Week of the State School of Agriculture at St. Lawrence University. The three Institute Schools and these two meetings provided five different parts of the State for four or more days in the year with the best expert teaching that could be obtained. Table No. 2, E is a complete list of the cooperative institutes.

In the summer of 1909, demonstration work with alfalfa was started with considerable success. F. R. Stevens, Farmers' Institute Conductor, was assigned to encourage and assist farmers in the growing of alfalfa. The farms of those who wished assistance were looked over, the field best adapted for it decided upon and advice given. The Experiment Station supplied inoculated soil to the farmer without cost for material or for freight. The total number of fields put out was exactly one hundred. No record of definite results will be made in this report, although many of the fields were visited a second time and the alfalfa found to be nicely started.

Meetings have also been held under the auspices of various city boards of health in the interest of improving city milk supplies. In connection with these, dairies have been inspected and recommendations made to the proper authorities for the improvement of bad conditions.

Speakers have been sent to various granges and other agricultural societies during the summer (Table 2, F).

The corps of speakers included some of the most successful institute workers of previous years, with a good representation from the State Agricultural College and State Experiment Station. Also many persons not previously engaged in institute work were on the programs of a limited number of meetings (Table No. 6).

A detailed but not too elaborate system of reporting institutes was followed by conductors and local correspondents. Forms for these reports, samples of institute programs and copy of the slips for those desiring bulletins are shown in Table No. 7.

Table No. 2 gives the dates and places of Farmers' Institutes in each county, also the total attendance and the average attendance per session from December, 1908, to March, 1909. It is readily seen where the Farmers' Institute work was the most popular, as, for example, in St. Lawrence, Monroe and Chemung counties. It should not, however, be inferred that because a county shows a small average attendance the meetings are not worth while. Such a locality may need the work as much as other places which show a larger attendance and may give quite as good a return for the investment.

Farmers' Institutes in this State have shown a steady increase in attendance and interest for many years, the total attendance of the last fiscal year being considerably greater than that of any previous year (Table No. 3). This success has been due to the earnest cooperation of all connected with the work and the steadily increasing appreciation of Farmers' Institutes by New York farmers. The local correspondents should be especially commended for their services which were rendered without remuneration. Some communities, granges and other agricultural societies have cooperated in the most effective manner, and often at considerable expense. The New York Central and Hudson River Railroad, Delaware and Hudson Company and Erie Railroad have aided the work by granting reduced rates.

For assistance in compiling the tables in this report, credit is due to Royal Gilkey of the Farmers' Institute Office.

A brief history of Farmers' Institute work, as well as several representative addresses delivered at Institute Schools and Farmers' Institutes, is included in this report.

R. A. PEARSON,
Commissioner of Agriculture.

Albany, N. Y., January 15, 1910.

STATISTICS

TABLE NO. 1.

FARMERS' INSTITUTES AND SPECIAL POULTRY INSTITUTES, JANUARY TO MARCH, 1908, INCLUSIVE.

A. FARMERS' INSTITUTES.

COUNTY	Place of meeting	Local correspondent	Date	Attendance
Oswego	So. West Oswego	W. W. Rounds, R. D. 7, Oswego.	January 6	165
Chautauqua	Sheridan	A. M. Geiger, Dunkirk, R. D. 10.	6	565
Herkimer	Vanhornesville	Aaron Dingman	6–7	660
Cattaraugus	Wesley	L. A. Parke, R. D. 1, Dayton.	7	500
Cayuga	Ira	O. H. Livingston	7–8	492
Herkimer	Warren	Lester Young	8	268
Washington	Salem	W. S. Barker	8	580
Onondaga	Syracuse (State Fruit Growers' Assn.)	E. C. Gillette, Sec'y	8–9	....
Wayne	North Rose	C. M. Clapp	9	375
Chautauqua	Gerry	Mrs. Lida G. Wilson	9	525
Otsego	West Exeter	John H. Watkins	9	225
Washington	Granville	F. M. Blossom	9	347
Chautauqua	Busti	J. W. Sanbury, R. D. 79, Jamestown.	10–11	720
Wayne	Sodus	Miss Flora N. Fleming	10–11	530
Herkimer	Newport	Milo Morey	10–11	976
Washington	Greenwich	John R. Pettys	10–11	483
Oneida	Trenton	John Andrew, Barneveldt.	13	620
Wayne	Williamson	A. B. Nash, Pultneyville.	13–14	1,345
Chautauqua	Sherman	Mrs. S. B. Willing	13–14	980
Rensselaer	Hoosick Falls	Jay C. Cotrell	13–14	586
Madison	Canastota	T. G. New	14	475
Columbia	Old Chatham	C. S. Ashley	14	176
Columbia	Kinderhook	Eugene Merwin	15	155
Lewis	Port Leyden	John L. Smith	15–16	687
Chautauqua	Westfield	J. L. Barber, R. D. 24.	15–16	770
Monroe	Webster	Geo. W. Dunn	15–16	1,470
Columbia	Claverack	R. N. Saunders	16–17	379
Monroe	Hilton	Elton B. Holden	17–18	966
Chautauqua	Brocton	G. E. Ryckman	17–18	540
Dutchess	Pine Plains	F. L. Tripp	18	599
Orleans	Kendall	H. E. Wellman	20	516
Erie	Marilla	Henry Adams	20–21	790
Lewis	Denmark	R. C. Otis	20–21	935
Dutchess	Clinton Corners	Smith Knapp	20–21	274
Orleans	Lyndonville	C. H. I. Potter	21	892
Dutchess	Poughkeepsie	....	22	127
Monroe	Rochester (Western New York Hort. Society).	John Hall, Secretary.	22–23	....
Erie	Harris Hill	Wm. H. Beach, Forks	22–23	610
Jefferson	Carthage	E. G. Lewis	22–23	830
Dutchess	Moores Mills	J. W. Skidmore	23	386
Niagara	Johnson's Creek	F. J. Swift, Middleport.	24	745
Erie	Springville	E. B. Dunbar	24–25	760
Jefferson	Antwerp	Miss Jennie A. Wait, R. D. 4.	24–25	1,325
Dutchess	Wiccopee	A. Haight	24–25	280
Orleans	Medina	Jay Allis	27–28	616
Cattaraugus	Machias	A. E. Wright	27–28	555
St. Lawrence	Canton	L. Dona	27–28	970
Putnam	Patterson	E. F. Hoyt, Brewster.	27–28	420
Putnam	Adams Corners	Geo. F. Barmore	29	252
Monroe	Brockport	S. W. Wadhams, Clarkson.	29–30	656
Cattaraugus	Salamanca	Wm. Niles	29–30	549
St. Lawrence	Heuvelton	N. E. A. Smithers	29–30	1,490
Westchester	Yorktown	Enos Lee	30	141
Wyoming	Wyoming	....	31	630
Orleans	Albion	John Bidleman	Jan. 31 Feb. 1	1,610
Wyoming	Arcade	V. C. Beebe	31 1	395
St. Lawrence	Potsdam	H. H. Minkler	31 1	895
Westchester	Peekskill	Miss Emma Tice	31 1	188

TABLE No. 1 — (*Continued*).

COUNTY	Place of meeting	Local correspondent	Date	Attendance
Suffolk	Huntington	Douglas Conklin	February 3	186
Jefferson	La Fargeville	A. W. Beckwith	3	210
Wyoming	Hermitage	Mrs. Clara E. Zeches, R. D. 2, Gainesville	3	65
Orleans	Holley	W. T. Pettingill	3–4	689
Wyoming	Bliss	G. F. Wing	4	310
Jefferson	Dexter	Fred. E. George, Limerick.	4	300
Suffolk	Southold	Geo. H. Wells	4	515
Livingston	Mount Morris	L. H. Walker	5	118
Jefferson	South Rutland	E. O. Andrus, Route B, Watertown.	5	340
Suffolk	Bridgehampton	H. T. Haney	5–6	1,150
Monroe	Spencerport	Wm. M. Clark	5–6	304
Livingston	Hunt	....	7	98
Genesee	Batavia	A. E. Brown	7–8	425
Jefferson	Woodville	G. H. Converse	7–8	420
Nassau	Mineola	Elwood V. Titus, Glen Cove.	7–8	307
Allegany	Rushford	D. H. Williams, Houghton.	8	130
Yates	Penn Yan (Farmers' Club).	A. C. Williams	8	50
Genesee	Darien	O. B. Yates	10	447
Allegany	Black Creek	L. D. Stowell	10	530
Oswego	Lacona	Albert Stevens	10–11	515
Rockland	Spring Valley	H. H. Brown	10–11	220
Genesee	Pavilion Centre	N. A. Duguid, Pavilion	11	580
Allegany	Alfred	F. S. Place	11–12	1,065
Oswego	Parish	H. L. Miller	12	390
Orange	Warwick	C. M. Houston, Wisner.	12	229
Genesee	Fort Hill	Roy McPherson, Le Roy.	12–13	890
Allegany	Whitesville	W. Leonard, Spring Mills.	13	728
Oswego	Central Square	John McKinley	13	400
Dutchess	Poughkeepsie (State Fruit Growers' Ass'n)	....	13–14	....
Orange	Goshen	John B. Gregory	13–14	247
Monroe	Fairport	S. J. Robbins	14–15	943
Steuben	Greenwood	F. J. Updike, Canisteo	14–15	965
Oswego	Fulton	Thomas Coles	14–15	673
Orange	Otisville	L. H. Mapes	15	203
Oswego	Palermo	M. E. Dolbear, R. D. 4, Fulton.	17	250
Sullivan	Monticello	W. B. McMillan	17–18	752
Steuben	Jasper	M. C. Hollenbeck	17–18	550
Wayne	Marion	A. B. Gurnee	17–18	870
Steuben	Troupsburg	....	18–19	542
Oswego	Phoenix	Mrs. Lizzie L. Carrier.	18–19	810
Sullivan	Liberty	A. J. D. Wedemeyer	19–20	1,510
Steuben	Addison	C. S. Whitmore	19–20	195
Ontario	Farmington	A. B. Katkamier, Macedon.	19–20	636
Livingston	Geneseo (Bean Growers.)	S. Fraser	19–20	....
Onondaga	Cicero	A. J. Loomis, Clay	20	385
Ontario	Manchester	Wm. W. Howland	21–22	411
Chemung	Elmira	Rufus Stanley	20–21–22	2,455
Oneida	Rome	Roy L. Bielby	21–22	270
Orange	Washingtonville	W. H. Hallock	21–22	486
Seneca	Seneca Castle	Levi A. Page	24–25	375
Schuyler	Alpine	S. D. Bolyen	24–25	901
Oneida	Clinton	C. H. Ellinwood	24–25	275
Orange	Newburg	J. R. Cornell	24–25	664
Livingston	Geneseo	....	26–27	300
Ontario	Halls Corners	T. B. Wilson	26–27	587
Tioga	Waverly	W. H. Swain	26–27	940
Oneida	Knoxboro	Mrs. A. J. Brewer, R. D., Oriskany Falls.	26–27	584
Ulster	Highland	Moses G. Young	26–27	581
Ulster	Accord	H. L. Devoe	28	111
Madison	Stockbridge	C. E. Love, Munnsville.	28–29	560

TABLE No. 1.— (*Concluded*).

COUNTY	Place of meeting	Local correspondent	Date	Attendance
Broome	Binghamton	Frank D. Lyon	February 28–29	900
Seneca	Seneca Falls	Wm. T. Beach, R. D. 3.	28–29	355
Ulster	Rosendale	Rufus Lefever	29	224
Cayuga	Atwater	G. L. Ferris	March 2	185
Broome	Union	Jesse E. Le Barron	2–3	708
Madison	North Brookfield	Alexis York, Poolville	2–3	310
Albany	Selkirk	I. L. Kimmey	2–3	372
Tompkins	Ludlowville	Dr. Wilber G. Fish	3–4	348
Albany	Normansville	E. J. Marsden, R. D., Delmar.	4	106
Cortland	Marathon	P. L. Conrad	4–5	753
Otsego	Garrettsville	Frank L. Mills	4–5	330
Rensselaer	West Sand Lake	H. J. Best, R. D	5–6	401
Tompkins	Newfield	C. B. Boice	5–6	545
Cortland	Cortland	A. J. Sears	6–7	567
Chenango	South New Berlin	A. E. Dixson	6–7	210
Tompkins	McLean	F. H. Benedict	7	230
Cayuga	Sennett	M. L. Hawley	9	325
Saratoga	Wilton	J. H. Westfall, R. D., Saratoga.	9	373
Madison	De Ruyter	John E. Hines	9–10	633
Otsego	Gilbertsville	Chas. P. Root	9–10	370
Saratoga	Gansevoort	John Gick, R. D., Saratoga.	10	241
Cayuga	Sherwood	W. A. Alexander, R. D., Union Springs.	10–11	628
Saratoga	Bacon Hill	Mrs. I. J. Wright, R. D. 4, Greenwich.	11	216
Otsego	East Worcester	Alfred Lape	11–12	575
Chenango	Plymouth	Chas. H. Stanton	11–12	689
Saratoga	Clifton Park Centre	J. F. Peck, Rexford Flats.	12	395
Cayuga	Port Byron	F. W. Jacobs	12	129
Chenango	McDonough	H. L. Aldrich	13	193
Onondaga	Plainville	James S. Schenck, Memphis.	13–14	585
Otsego	Schenevus	A. B. Cass	13–14	545
Montgomery	Minaville	C. B. De Graff, R. D. 2, Amsterdam.	13–14	514
Delaware	Sidney	E. K. Walters	14	575
Montgomery	Charleston Four Corners.	Dr. C. I. Conover, R. D., Sprakers.	16–17	293
Otsego	Westville	Geo. Chamberlain, R. D. 1, Schenevus.	16–17	108
Oswego	Mexico	W. A. Robbins	16–17	525
Oswego	Williamstown	C. A. Whaley	18	322
Ontario	Canandaigua	H. L. Howe	18–19	278
Chenango	Bainbridge	H. H. Lyon	18–19	205
Montgomery	Glen	C. F. Van Horne	18–19	435
Oneida	Camden	Mrs. Dora C. Davis	19–20	583
Fulton	Broadalbin	Harry Goodemote	20	319
Chenango	Greene	Eugene Spencer	20–21	1,025
Fulton	Mayfield	G. W. Haines	21	380
Yates	Rushville	....	21	755
Montgomery	Ames	H. Clay Seeber, R. D. 1, Canajoharie.	23–24	346
Madison	West Eaton	....	23–24	289
Livingston	Linwood	....	27	330
Niagara	Ransomville	....	28	500

Total attendance reported 85,861

B. SPECIAL POULTRY INSTITUTES

COUNTY	Place of meeting	Local correspondent	Date	Attendance
Tompkins	Ithaca (Cornell University).	J. E. Rice	Feb. 18–19–20	....
Yates	Penn Yan	G. L. Wheeler, R. D. 8	March 2–3	....
Genesee	Corfu	Charles Phelps	4–5	....
Cayuga	Auburn	J. H. Scott	6–7	....
Saratoga	Ballston Spa	Geo. W. De Ridder, R. D. 2.	9–10	....
Suffolk	Riverhead	....	12	....
Westchester	White Plains	Frank W. Gaylor	11–12	....
Nassau	Mineola	Robt. Seaman, Jericho.	13–14	....

TABLE No. 2.

INSTITUTE WORK OCTOBER 1, 1908, -- SEPTEMBER 30 1909.

A. REGULAR INSTITUTES DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

COUNTY AND PLACE OF MEETING	Local Correspondent	Date	Number of sessions	Attendance	Average per session
ALBANY		1908	14	1,021	73
Altamont	W. D. Wright	Dec. 23	3	226	75
Clarksville	L. Appleby	" 22	3	200	67
Selkirk	I. L. Kimmey	" 18, 19	5	307	61
Westerlo	E. King	" 21	3	288	96
ALLEGANY:		1909	12	2,053	171
Angelica	J. C. Phippen	Jan. 19, 20	5	658	132
Black Creek	L. D. Stowell	" 18, 19	4	620	155
Whitesville	W. Leonard	" 21	3	775	258
BROOME:			15	1,385	92
Binghamton	J. E. Evans	Feb. 16, 17	4	355	89
Chenango Bridge	C. E. Gross	" 22, 23	6	580	97
Deposit	D. Axtell	" 17, 18	5	450	90
CATTARAUGUS:			19	3,022	159
Cattaraugus	E. C. Pritchard	Jan. 14, 15	4	776	194
Cottage	A. M. Howlett	" 13	3	363	121
Little Valley	W. F. Niles	" 15, 16	3	268	89
Machias	A. E. Wright	" 20	3	675	225
Napoli	C. E. Van Aken	" 16	3	503	168
Portville	E. G. Dusenbury	" 18	3	437	146
CAYUGA:			15	1,945	130
East Venice	N. G. Arnold	Feb. 3	3	470	157
Five Corners	N. J. Atwater	" 3	3	265	88
Moravia	W. D. Curtis	" 5	3	290	97
Scipio	W. A. Alexander	" 4	3	395	132
Sennett	F. J. Riley	" 4	3	525	175
CHAUTAUQUA:			33	5,585	169
Bemus Point	C. C. Hazzard	Jan. 8, 9	5	785	157
Ellington	L. G. Brainard	" 14	3	715	238
Forestville	Mrs. A. M. Keach	" 12, 13	5	1,145	229
Lakewood	J. W. Sanbury	" 6, 7	5	590	118
Sherman	F. Ottaway	" 5, 6	5	582	116
Stockton	W. W. Pickett	" 11, 12	5	688	138
Westfield	J. L. Barber	" 4, 5	5	1,080	216
CHEMUNG:			14	2,783	199
Big Flats	F. A. Havens	Feb. 4	3	630	210
Elmira	R. Stanley	" 4, 5, 6	8	1,650	206
Erin	J. L. Smith	" 8	3	503	168
CHENANGO:			22	2,136	97
Bainbridge	C. Kirby	Feb. 24, 25	5	400	80
Greene	E. M. Spencer	" 19, 20	5	745	149
McDonough	H. L. Aldrich	" 18	3	347	116
New Berlin	R. T. Talbot	" 24, 25	4	161	40
Plymouth	C. H. Stanton	" 24, 25	5	483	97
CLINTON:		1908	11	1,260	115
Chazy	S. Gordon	Dec. 21	3	287	96
Ellenburg Depot	I. L. Sheldon	" 22	3	215	72
Peru	S. H. Clark	" 18, 19	5	758	152

TABLE No. 2 — (*Continued*).

A. REGULAR INSTITUTES DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

COUNTY AND PLACE OF MEETING	Local Correspondent	Date	Number of sessions	Attendance	Average per session
COLUMBIA:		1909	**13**	**1,132**	**87**
Claverack	R. N. Saunders	Jan. 8	3	170	57
Germantown	H. Finger	“ 8, 9	4	445	111
Hillsdale	W. P. Evarts	“ 7	3	235	78
Kinderhook	E. Merwin	“ 7	3	282	94
CORTLAND:			**12**	**2,037**	**169**
Cincinnatus	J. M. Jones	Feb. 6	3	318	106
Cortland	A. J. Sears	“ 5, 6	4	730	183
Marathon	F. L. Smith	“ 8, 9	5	989	198
DELAWARE:		1908	**24**	**2,797**	**117**
Andes	O. D. Smith	Dec. 14	3	252	84
Davenport	J. R. Frazier	“ 9, 10	5	814	163
Delhi	F. E. Davis	“ 11, 12	5	528	106
Franklin	C. E. Chamberlain	“ 8	3	311	104
Halcottsville	A. R. Sanford	“ 15, 16	5	514	103
Sidney	E. K. Waters	“ 7	3	378	126
DUTCHESS:		1909	**21**	**1,870**	**89**
Clinton Corners	S. Knapp	Jan. 13, 14	5	380	76
Pine Plains	F. L. Tripp	“ 11, 12	5	660	132
Poughkeepsie	W. E. Leak	“ 15	3	186	62
Upper Red Hook	J. A. Fraleigh	“ 11, 12	5	377	75
Wiccopee	A. V. Haight	“ 16	3	267	89
ERIE:			**20**	**2,436**	**122**
Akron	M. M. Flint	Jan. 8, 9	3	390	130
Alden	H. D. Bacon	“ 5	3	317	106
Buffalo	C. J. Standart	Feb. 5	3	160	53
Harris Hill	W. E. Frick	Jan. 8	3	470	157
Holland	C. J. Paul	“ 6, 7	5	584	117
Marilla	H. Adams	“ 7	3	515	172
ESSEX:		1908	**17**	**2,468**	**145**
Crown Point	W. S. Green	Dec. 14	3	626	209
Jay	J. F. Boynton, Jr.	“ 16, 17	5	943	189
Keeseville	C. B. White	“ 17	3	306	102
Lewis	O. Hathaway	“ 16	3	303	101
Westport	C. A. Barber	“ 15	3	290	97
FRANKLIN:			**16**	**1,927**	**120**
Brushton	T. O'Connell	Dec. 21, 22	5	785	157
Burke	W. L. Witherill	“ 23	3	293	98
Malone	L. L. Foote	“ 18, 19	5	536	107
North Bangor	W. D. Taylor	“ 23	3	313	104
FULTON:		1909	**9**	**611**	**68**
Broadalbin	H. Goodemote	Jan. 4, 5	3	223	74
Ephratah	C. Snell	“ 5	3	169	56
Mayfield	G. W. Haines	“ 4	3	219	73
GENESEE:			**25**	**4,223**	**169**
Batavia	G. Prole	Jan. 21, 22, 23	6	1,450	242
Byron Centre	I. C. H. Cook	“ 19, 20	3	383	128
Darien	O. B. Yates	“ 4, 5	3	515	172
Elba	J. S. Wilford	“ 20, 21	5	780	156
Fort Hill	C. E. Seward	“ 18, 19	5	585	117
Pavilion Centre	R. Bradley	“ 18	3	510	170

TABLE No. 2 — (*Continued*).

A. REGULAR INSTITUTES DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

COUNTY AND PLACE OF MEETING	Local Correspondent	Date	Number of sessions	Attendance	Average per session
GREENE:		1908	12	1,041	87
Hensonville	G. B. Ayres	Dec. 9	3	335	112
Oak Hill	C. A. Hall	" 7, 8	4	278	70
Prattsville	W. B. Chatfield	" 10, 11	5	428	86
HERKIMER:		1909	17	1,628	96
Ilion	H. W. Gifford	Jan. 7, 8	4	213	53
Newport	M. Morey	" 9	3	484	161
Russia	P. S. Carpenter	" 8, 9	3	252	84
Vanhornesville	A. Dingman	" 6	3	325	108
Warren	L. Young	" 6, 7	4	354	89
JEFFERSON:			32	5,069	158
Adams	C. M. Pierce	Feb. 1	3	420	140
Carthage	E. G. Lewis	Jan. 15, 16	5	754	151
Chaumont	A. A. Daniels	" 27, 28	4	983	246
Dexter	F. E. George	" 26, 27	4	625	156
Philadelphia	A. W. Danforth	" 25	3	506	169
Smithville	A. A. Robbins	Feb. 1	3	372	124
South Rutland	E. O. Andrus	Jan. 25, 26	4	709	177
Watertown	O. E. Hinds	" 29, 30	6	700	117
LEWIS:			20	2,402	120
Barnes Corners	R. E. Gregg	Jan. 13, 14	4	520	130
Beaver Falls	G. Archer	" 11, 12	5	775	155
Denmark	R. C. Otis	" 14, 15	4	490	123
Harrisburg	E. E. Hodge	" 12, 13	4	247	62
Port Leyden	J. L. Smith	" 11	3	370	123
LIVINGSTON:			17	2,440	143
Caledonia	J. C. Mitchell	Jan. 15, 16	4	650	163
Linwood	W. P. Pierson	" 14, 15, 16	5	890	178
Livonia	F. M. Davis	" 25, 26	5	657	131
Mount Morris	L. H. Walker	" 13, 14	3	243	81
MADISON:		1908	31	3,292	106
Brookfield	F. M. Spooner	Dec. 14, 15	5	683	137
		1909			
Canastota	T. G. New	Feb. 17, 18	6	429	72
De Ruyter	I. S. Sears	" 18, 19	6	655	109
Hamilton	W. F. Ingalls	" 16, 17	4	262	66
Morrisville	B. F. Sanford	" 22, 23	6	650	108
Stockbridge	C. E. Love	" 19, 20	4	613	153
MONROE:			40	8,086	202
Brockport	G. W. Sime	Feb. 17, 18	5	730	146
Churchville	G. E. Savage	" 18, 19	4	473	118
Gates	H. C. Deming	" 19	3	405	135
Greece	F. J. Mitchell	" 8	3	480	160
Hilton	F. Curtis	" 8	3	950	317
Industry	F. H. Briggs	" 6	2	1,290	645
Mumford	W. S. Cox	" 19, 20	5	253	51
Penfield	F. A. Church	" 20	3	435	145
Webster (Woman's session)	Mrs. B. F. Woodhull	" 4	3	625	208
Webster	G. W. Dunn	" 5, 6	6	1,950	325
West Henrietta	F. L. Martin	" 18	3	495	165
MONTGOMERY:			12	1,397	116
Ames	L. Timmerman	Jan. 4, 5	3	530	177
Charleston-Four-Corners	Dr. C. L. Conover	" 5, 6	3	311	104
Fonda	E. C. Davis	" 5	3	205	68
Minaville	C. B. De Graff	" 6	3	351	117

TABLE No. 2 — (*Continued*).

A. REGULAR INSTITUTES DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

COUNTY AND PLACE OF MEETING	Local Correspondent	Date	Number of sessions	Attendance	Average per session
NASSAU:		1909	**4**	**265**	**66**
Mineola	E. V. Titus	Jan. 22, 23	4	265	66
NIAGARA:			**8**	**1,365**	**171**
Johnson's Creek	F. J. Swift	Feb. 11	3	515	172
Ransomville	W. D. Wisner	“ 10, 11	5	850	170
ONEIDA:			**28**	**3,756**	**134**
Camden	Mrs. D. C. Davis	Feb. 10, 11	6	789	132
Chadwicks	Mrs. B. M. Bowen	“ 13	3	131	44
Clinton	L. N. Brockway	“ 12, 13	4	511	128
Clinton	L. N. Brockway	Mar. 20	1	310	310
Knoxboro	W. Lawson	Feb. 15, 16	5	599	120
Rome	R. L. Bielby	“ 11, 12	6	753	126
Trenton	W. L. Frame	“ 15	3	663	221
ONONDAGA:			**26**	**2,903**	**112**
Baldwinsville	J. F. Connell	Feb. 12, 13	5	515	103
Cicero	E. Miller	“ 10, 11	5	1,085	217
Manlius	C. F. Ferris	“ 10, 11	5	425	85
Marcellus	R. Stone	“ 12, 13	5	508	102
Tully	W. W. Estey	“ 8, 9	6	370	62
ONTARIO:			**24**	**2,590**	**108**
Bristol Springs	E. Coye	Jan. 17	3	370	123
Halls Corners	R. F. Hall	“ 29, 30	4	500	125
Manchester	J. Q. Wells	“ 28	3	320	107
Manchester	J. Q. Wells	Mar. 16	3	365	122
Phelps	G. W. Salisbury	Jan. 27, 28	5	371	74
Seneca Castle	L. A. Page	“ 29	3	349	116
Victor	G. B. Pickering	“ 26	3	315	105
ORANGE:			**30**	**2,721**	**91**
Balmville	N. C. Barnes	Jan. 20	3	340	113
Bullville	I. V. Ellis	“ 29	3	264	88
Goshen	W. Hughes	“ 26	3	302	101
Hamptonburg	D. V. Farley	“ 23	3	225	75
Montgomery	G. A. Mould	“ 30	3	127	42
Newburg	C. O. Warford	“ 21	3	275	92
Otisville	L. H. Mapes	“ 27	3	285	95
Unionville	M. A. Lane	“ 28	3	450	150
Warwick	T. Welling	“ 25	3	200	67
Washingtonville	W. H. Bull	“ 22	3	253	84
ORLEANS:			**20**	**3,755**	**188**
Albion	J. Bidelman	Feb. 12, 13	5	1,810	362
Holley	H. S. Glidden	“ 16, 17	4	395	99
Kendall	H. E. Wellman	“ 9	3	405	135
Lyndonville	C. H. I. Potter	“ 9	3	525	175
Medina	J. E. Allis	“ 15, 16	5	620	124
OSWEGO:			**39**	**5,418**	**139**
Fulton	T. Coles	Feb. 5	3	578	193
Hannibal	Mrs. R. G. Hopper	“ 4, 5	6	1,119	187
Lacona	E. R. Stevens	“ 2	3	170	57
Mexico	W. A. Robbins	“ 3, 4	6	1,007	168
Palermo	M. E. Dolbear	“ 5, 6	3	367	122
Phoenix	W. H. Carrier	“ 8, 9	6	767	128
Pulaski	H. L. Clark	“ 2, 3	6	729	122
Williamstown	E. N. Harris	“ 9, 10	6	681	114

TABLE No. 2 — (*Continued*).

A. REGULAR INSTITUTES DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

COUNTY AND PLACE OF MEETING	Local Correspondent	Date	Number of sessions	Attendance	Average per session
OTSEGO:		1908	**23**	**2,140**	**93**
Edmeston	D. N. Barrett	Dec. 16, 17	5	664	133
Fly Creek	J. Taylor	" 22, 23	5	290	58
Morris	A. Z. Carlton	" 18, 19	5	322	64
Schenevus	M. R. Bulson	" 15, 16	5	688	138
Westville	G. Chamberlain	" 21	3	176	59
PUTNAM:		1909	**10**	**1,241**	**124**
Adams Corners	G. F. Barmore	Jan. 19	3	247	82
Carmel	J. L. Lee	" 18	3	250	83
Patterson	E. F. Hayt	" 15, 16	4	744	186
RENSSELAER:		1908	**12**	**1,077**	**90**
Centre Brunswick	I. W. Abbott	Dec. 23	3	271	90
Hoosick Falls	J. C. Cottrell	" 7	3	250	83
Nassau	I. H. Boyce	" 22	3	216	72
Stephentown	W. L. Cranston	" 21	3	340	113
ROCKLAND:		1909	**5**	**221**	**44**
Tallman	W. H. Way	Jan. 18, 19	5	221	44
ST. LAWRENCE:			**20**	**4,600**	**230**
Edwards	Miss V. A. Harmon	Jan. 22, 23	5	487	97
Heuvelton	N. E. A. Smithers	" 21, 22	5	1,655	331
Madrid	T. F. Rutherford	" 19, 20	5	1,718	344
Winthrop	G. Kingsbury	" 18, 19	5	740	148
SARATOGA:		1908	**15**	**1,508**	**101**
Bacon Hill	W. S. Ostrander	Dec. 9	3	254	85
Charlton	G. F. Smith	" 8	3	431	144
Clifton Park Centre	J. F. Peck	" 7	3	252	84
Greenfield Centre	W. G. Robinson	" 9	3	315	105
Gurnspring	J. H. Westfall	" 10	3	256	85
SCHENECTADY:			**9**	**668**	**74**
Duanesburg	A. Gaige	Dec. 17	3	291	97
Mariaville	C. A. Cullings	" 18	3	198	66
Pattersonville	I. F. Patterson	" 19	3	179	60
SCHOHARIE:			**20**	**1,898**	**95**
Argusville	J. A. Gordon	Dec. 17	3	291	97
Cobleskill	B. Aker	" 18, 19	5	465	93
Gallupville	M. G. Zimmer	" 22	3	315	105
Gilboa	D. W. Southard	" 12	3	322	107
Jefferson	E. G. Danforth	" 14	3	349	116
Middleburg	H. S. Manning	" 21	3	156	52
SCHUYLER:		1909	**15**	**1,876**	**125**
Catherine	J. P. Frost	Feb. 3	3	367	122
Reading Centre	E. K. Smith	" 1	3	525	175
Tyrone	L. Beach	" 2	3	251	84
Valois	C. Sheffield	" 2	3	213	71
Wayne	D. E. Hoover	" 1	3	520	173
SENECA:			**10**	**1,342**	**134**
Lodi	C. S. Close	Feb. 1, 2	5	585	117
Waterloo	J. G. Pearson	" 1, 2	5	757	151

TABLE No. 2 — (*Continued*).

A. REGULAR INSTITUTES DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

COUNTY AND PLACE OF MEETING	Local Correspondent	Date	Number of sessions	Attend-ance	Average per session
STEUBEN:		1909	**36**	**6,272**	**174**
Avoca	C. H. Everett	Jan. 28	3	635	212
Bath	H. S. Emerson	" 29, 30	5	669	134
Cohocton	J. C. Flint	" 27	3	645	215
Greenwood	F. J. Updike	" 22, 23	5	1,230	246
Hornell	N. W. Cone	" 25, 26	5	955	191
Jasper	A. E. Whipple	" 21, 22	3	540	180
Prattsburg	R. A. Walker	" 27	3	580	193
Rathbone	A. E. Loper	" 25, 26	3	350	117
Savona	I. Johnson	" 28	3	393	131
Troupsburg	J. W. Rigby	" 22, 23	3	275	92
SUFFOLK:			**14**	**2,885**	**206**
Bridgehampton	H. T. Haney	Jan. 25	3	1,040	347
Bridgehampton	H. T. Haney	Mar. 10	2	580	290
Huntington	H. Paulding, Jr	Jan. 28	3	245	82
Riverhead	F. A. Sirrine	" 27	3	325	108
Southold	G. H. Wells	" 26	3	695	232
SULLIVAN:		1908	**10**	**1,128**	**113**
Liberty	A. J. D. Wedemeyer	Dec. 7, 8	5	495	99
Monticello	W. B. McMillan	" 9, 10	5	633	127
TIOGA:		1909	**15**	**2,470**	**165**
Newark Valley	F. W. Witter	Feb. 12, 13	5	1,025	205
Owego	J. Forsythe	" 15, 16	5	320	64
Waverly	W. H. Swain	" 8, 9	5	1,125	225
TOMPKINS:			**15**	**1,510**	**101**
East Lansing	C. L. Buck	Feb. 11	3	300	100
Enfield Centre	F. D. Rumsey	" 10	3	283	94
McLean	W. Bartholomew	" 11	3	340	113
Newfield	C. B. Boice	" 10	3	344	115
Speedsville	N. Slate	" 12	3	243	81
ULSTER:		1908	**17**	**1,408**	**83**
Ellenville	R. T. Cookingham	Dec. 11	3	270	90
Kingston	J. C. Kraft	" 14	3	80	27
Milton	F. Burgess	" 17	3	410	137
New Paltz	I. C. Barnes	" 15, 16	5	378	76
Stone Ridge	C. C. Hardenburgh	" 12	3	270	90
WASHINGTON:			**24**	**2,662**	**111**
Argyle	R. A. Hale	Dec. 14	3	460	153
Greenwich	J. R. Pettys	" 10	3	277	92
Hartford	A. Gilchrist	" 12	3	498	166
Kingsbury	J. Keyworth	" 11	3	137	46
North Easton	G. N. Allen	" 8	3	321	107
Putnam	C. H. McLaughlin	" 15	3	381	127
Salem	W. S. Barker	" 11	3	200	67
West Hebron	W. E. Getty	" 12	3	388	129
WAYNE:		1909	**24**	**3,735**	**156**
Lyons	W. G. Sisson	Feb. 22	3	470	157
North Rose	C. M. Clapp	" 2, 3	4	640	160
Ontario	G. P. Norton	" 4	3	755	252
Palmyra	F. L. Reeves	" 23	3	306	102
Red Creek	C. S. Madan	" 2	3	335	112
Sodus	B. J. Case	" 3, 4	5	696	139
Walworth	W. H. Lawrence	" 22	3	533	178
WESTCHESTER:			**5**	**360**	**72**
Yorktown Heights	E. Lee	Jan. 20, 21	5	360	72

TABLE No. 2 — (*Continued*).

A. REGULAR INSTITUTES DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

COUNTY AND PLACE OF MEETING	Local Correspondent	Date	Number of sessions	Attendance	Average per session
WYOMING:		1909	**15**	**3,490**	**233**
Attica	C. W. Glor	Jan. 4	3	615	205
Bliss	E. J. Foote	" 11	3	525	175
Castile	S. L. Strivings	" 12, 13	3	860	287
Warsaw	G. T. Luce	" 12	3	605	202
Wyoming	E. C. Hayden	" 11	3	885	295
YATES:			**11**	**1,199**	**109**
Dundee	S. H. Marsh	Feb. 17, 18	5	615	123
Rushville	E. L. Moody	" 15, 16	6	584	97
TOTAL			**997**	**132,509**	**133**

B. INSTITUTE SCHOOLS.

COUNTY AND PLACE OF MEETING	Local Correspondent	Date	Number of sessions	Attendance	Average per session
ALLEGANY:		1909			
Alfred	B. C. Davis	Mar. 1, 2, 3, 4	11	3,494	318
DELAWARE:					
Delhi	A. J. Nicoll	" 1, 2, 3, 4	11	2,443	222
MONROE:					
Spencerport	W. M. Clark	" 1, 2, 3, 4	11	3,903	355
TOTAL			**33**	**9,840**	**298**

C. BEE-KEEPERS' INSTITUTES.

COUNTY AND PLACE OF MEETING.	Local Correspondent	Date	Number of sessions	Attendance	Average per session
ALBANY:		1909			
Albany	D. A. Frazier	Mar. 15	3	200	67
CAYUGA:					
Auburn	J. W. Pierson	" 10	2	44	22
MONTGOMERY:					
Amsterdam	T. I. Dugdale	" 12	3	110	37
ONEIDA:					
Utica	J. Russell	" 12	2	110	55
ONONDAGA:					
Syracuse	J. H. Cunningham	" 11	3	114	38
ONTARIO:					
Geneva	C. B. Howard	" 10, 11	5	175	35
ST. LAWRENCE:					
Gouverneur	C. A. Hallegas, G. B. Howe	" 16, 17	5	425	85
WARREN:					
Glens Falls	Miss M. G. De Vine	" 13	3	43	14
WYOMING:					
Perry	F. H. Minor	" 9	2	56	28
TOTAL			**28**	**1,277**	**46**

TABLE No. 2 — (*Concluded*).

D SPECIAL PERIODS FOR STUDENTS IN PUBLIC SCHOOLS IN CONNECTION WITH INSTITUTE SCHOOLS. (ATTENDANCE BEING COMPULSORY IT IS NOT INCLUDED IN PRECEDING FIGURES.)

COUNTY AND PLACE OF MEETING	Date	Number of periods	Attendance	Average per period
	1909			
Allegany, Alfred	Mar. 1, 2, 3, 4	4	682	171
Delaware, Delhi	" 1, 2, 3, 4	12	1,559	130
Monroe, Spencerport	" 1, 2, 3, 4	8	1,331	166
TOTAL		24	3,572	149

E. COOPERATIVE INSTITUTES.

Cornell University — Poultry Institute; Farmers' Week.
St. Lawrence University — Farmers' Week.
New York State Dairymen's Association.
New York State Breeders' Association.
New York State Fruit Growers' Association.
Otsego County Poultry Association.

F. MISCELLANEOUS MEETINGS TO WHICH DEPARTMENT SPEAKERS WERE SENT.

COUNTY	Place	Date	COUNTY	Place	Date
		1909			1909
Albany	South Westerlo	Sept. 1	Oswego	Dempster	Sept. 3
Broome	Binghamton	Aug. 24	Otsego	Morris	Aug. 28
Chautauqua	Jamestown	April 7	St. Lawrence	Waddington	Sept. 1
	Chautauqua	Aug. 21	Saratoga	Charlton	Sept. 1
	Ellington	Sept. 11	Schoharie	Jefferson	Aug. 27
Chemung	Elmira	Aug. 28	Steuben	Hornell	July 8
Clinton	Plattsburg	Sept. 1	Tompkins	Ithaca	Sept. 7
Columbia	Kinderhook	July 24		North Lansing	Sept. 25
Dutchess	Pawling	Sept. 2	Washington	Cambridge	June 15
Greene	Hensonville	Sept. 8		Salem	July 22
Jefferson	Watertown	Sept. 1		Greenwich	Aug. 17
Nassau	Mineola	Sept. 21	Wayne	North Rose	July 28
Niagara	Cambria Centre	May 29		Lake Side	Aug. 19
	Olcott Beach	Aug. 6, 7	Westchester	Peekskill	Sept. 23
	Lockport	Sept. 29	Wyoming	Castile	Sept. 15

TABLE NO. 3.

RECAPITULATION FOR REGULAR INSTITUTES, INSTITUTE SCHOOLS AND BEE-KEEPERS' INSTITUTES, DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

(It should be noted that the following figures do not cover cooperative institutes, miscellaneous meetings to which Department speakers were sent, or special periods for students in public schools.)

A. SESSIONS, TOTAL ATTENDANCE AND AVERAGE PER SESSION.

	Sessions	Total attendance	Average per session
Regular institutes	997	132,509	133
Institute schools (regular sessions)	33	9,840	298
Bee-keepers' institutes	28	1,277	46
Total	1,058	143,626	136

B. NUMBER OF DAYS' WORK IN EACH COUNTY.

(Three regular sessions constitute one day.)

COUNTY	Days	COUNTY	Days
REGULAR INSTITUTES		REGULAR INSTITUTES	
Albany	4⅔	Putnam	3⅓
Allegany	4	Rensselaer	4
Broome	5	Rockland	1⅔
Cattaraugus	6⅓	St. Lawrence	6⅔
Cayuga	5	Saratoga	5
Chautauqua	11	Schenectady	3
Chemung	4⅔	Schoharie	6⅔
Chenango	7⅓	Schuyler	5
Clinton	3⅔	Seneca	3⅓
Columbia	4⅓	Steuben	12
Cortland	4	Suffolk	4⅔
Delaware	8	Sullivan	3⅓
Dutchess	7	Tioga	5
Erie	6⅔	Tompkins	5
Essex	5⅔	Ulster	5⅔
Franklin	5⅓	Washington	8
Fulton	3	Wayne	8
Genesee	8⅓	Westchester	1⅔
Greene	4	Wyoming	5
Herkimer	5⅔	Yates	3⅔
		INSTITUTE SCHOOLS	
Jefferson	10⅔	Allegany	3⅔
Lewis	6⅔	Delaware	3⅔
Livingston	5⅔	Monroe	3⅔
Madison	10⅓		
Monroe	13⅓		
		BEE-KEEPERS' INSTITUTES	
		Albany	1
Montgomery	4	Cayuga	⅔
Nassau	1⅓	Montgomery	1
Niagara	2⅔	Oneida	⅔
Oneida	9⅓	Onondaga	1
Onondaga	8⅔		
Ontario	8	Ontario	1⅔
		St. Lawrence	1⅔
Orange	10	Warren	1
Orleans	6⅔	Wyoming	⅔
Oswego	13		
Otsego	7⅔	Total in all counties	352⅔

TABLE No. 3 — (*Continued*).

C. NUMBER OF INSTITUTES EACH MONTH AND ATTENDANCE BY MONTHS.

December	64	institutes held; attendance at all sessions	23,687
January	108	institutes held; attendance at all sessions	56,616
February	88	institutes held; attendance at all sessions	50,952
March	15	institutes held; attendance at all sessions	12,371
Total	275		143,626

TABLE No. 4.

COUNTIES ARRANGED ACCORDING TO DATES OF THEIR REGULAR INSTITUTES, DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE.

Saratoga	Dec. 7-10	Rockland	Jan. 18-19
Sullivan	“ 7-10	Allegany	“ 18-21
Greene	“ 7-11	St. Lawrence	“ 18-23
Delaware	“ 7-16	Westchester	“ 20-21
Rensselaer	“ 7, 21-23	Orange	“ 20-30
Washington	“ 8, 10-15	Steuben	“ 21-30
Ulster	“ 11-17	Nassau	“ 22-23
Schoharie	“ 12-14, 17-22	Suffolk	“ 25-28; Mar. 10
Essex	“ 14-17	Seneca	Feb. 1-2
Madison	“ 14-15; Feb. 16-23	Schuyler	“ 1-3
Otsego	“ 15-23	Oswego	“ 2-10
Schenectady	“ 17-19	Wayne	“ 2-4, 22-23
Clinton	“ 18-22	Cayuga	“ 3-5
Albany	“ 18-23	Chemung	“ 4-8
Franklin	“ 18-23	Monroe	“ 4-8, 17-20
Fulton	Jan. 4-5	Cortland	“ 5-9
Montgomery	“ 4-6	Onondaga	“ 8-13
Wyoming	“ 4, 11-13	Tioga	“ 8-9, 12-16
Chautauqua	“ 4-14	Orleans	“ 9, 12-17
Genesee	“ 4-5, 18-23	Niagara	“ 10-11
Erie	“ 5-9; Feb. 5	Tompkins	“ 10-12
Herkimer	“ 6-9	Oneida	“ 10-16; Mar. 20
Columbia	“ 7-9	Yates	“ 15-18
Lewis	“ 11-15	Broome	“ 16-18, 22-23
Dutchess	“ 11-16	Chenango	“ 18-20, 24-25
Cattaraugus	“ 13-18, 20		
Livingston	“ 13-16, 25-26		
Putnam	“ 15-19		
Jefferson	“ 15-16, 25; Feb. 1		
Ontario	“ 17, 26-30; Mar. 16		

TABLE No. 5.

CONDUCTORS IN CHARGE OF FOUR GROUPS INTO WHICH INSTITUTES WERE DIVIDED, JANUARY, 1909, TO FEBRUARY, 1909, INCLUSIVE.

Fred E. Gott, Spencerport, in charge Northwestern New York.
Jared Van Wagenen, Jr., Lawyersville, in charge Northern New York.
T. B. Wilson, Halls Corners, in charge Hudson Valley and Long Island.
D. P. Witter, Berkshire, in charge Southwestern New York.

ALTERNATE AND ASSISTANT CONDUCTORS.

J. G. Curtis, South Greece, assistant to Conductor Witter.

F. R. Stevens, Skaneateles, assistant to Conductor Wilson in January and Conductor Gott in February.

C. H. Tuck, Cornell University, Ithaca, Alternate Conductor.

Edward Van Alstyne, Kinderhook, Alternate Conductor in Northwestern New York in February.

Dr. E. M. Santee, Cortland, Farmers' Institute Lecturer, acted as assistant to Conductor Van Wagenen.

TABLE No. 6.

SPEAKERS AT REGULAR INSTITUTES, INSTITUTE SCHOOLS AND BEE-KEEPERS' INSTITUTES, DECEMBER, 1908, TO MARCH, 1909, INCLUSIVE, WITH DATES OF SERVICE.

Alderman, W. H., Geneva	Feb. 1-4; Mar. 2-4
Babcock, Prof. E. S., Clinton	Dec. 21; Feb. 3-4
Barnes, T. S., Rhinecliff	Jan. 12
Barron, J. H., Nunda	Dec. 7-14; Jan. 19-30
Barrows, Miss Anna, New York City	Jan. 23-28; Feb. 4
Benedict, F. H., McLean	Feb. 11
Bissell, Dr. Wm. G., Buffalo	Feb. 5
Bradley, Wm. L., Pavilion	Jan. 18
Brill, G. D., Bedford Station	Feb. 9-12, 15-20
Brodhead, Dr. C. W., Montrose, Pa.	Jan. 11-28; Feb. 2-6
Bump, H. P., Ferndale	Dec. 9
Burke, J. W., Batavia	Jan. 22
Call, A. H., Stafford	Jan. 23
Card, F. W., Sylvania, Pa.	Dec. 7-23; Feb. 1-25; Mar. 1-4
Cary, Geo., Gansevoort	Mar. 13
Case, B. J., Sodus	Feb. 4
Case, H. L., Canandaigua	Mar. 10
Cavanaugh, Prof. G. W., Ithaca	Jan. 22-25; Mar. 1-2
Collins, Judge I. W., Lyons	Feb. 22
Colson, Mrs. F. D., Albany	Mar. 2-4
Converse, F. A., Buffalo	Feb. 5
Cook, Dean H. E., Canton	Mar. 1-2
Cook, Irving C. H., South Byron	Jan. 23
Craig, Prof. John, Ithaca	Mar. 2-3
Curtis, J. G., Rochester	Dec. 7-19; Jan. 4-Feb. 24

TABLE No. 6—(*Continued*).

Daniels, W. S., Morganville	Jan. 23
Dann, Miss Matie J., Walton	Mar. 3
Davis, Pres. Boothe C., Alfred	Mar. 1
Dawley, M. Ray, Kingston, N. J.	Dec. 7-22; Jan. 4-Feb. 13
Day, Chas. M., Geneva	Dec. 7-19; Jan. 4-Feb. 25; Mar. 1-4
Demarest, C. D., Waterloo	Feb. 1
De Vine, Dr. J. F., Goshen	Dec. 7-23; Jan. 5-Feb. 24; Mar. 1-4
Deyo, I. T., Binghamton	Feb. 16
Dollar, E. H., Heuvelton	Dec. 7-23; Jan. 5-26, 29-Feb. 25; Mar. 1-4
Dugdale, T. I., West Galway	Mar. 12
Eastman, A. R., Waterville	Jan. 11-12; Mar. 1, 4
Eastman, Rev. S. E., Elmira	Feb. 5
Ennis, John A., Pattersonville	Dec. 7-19; Jan. 4-30
Evans, J. E., Binghamton	Feb. 17
Felt, Dr. E. P., Albany	Dec. 16-17; Jan. 7-9
Fippin, Prof. E. O., Ithaca	Mar. 1-2
Gillette, E. C., Penn Yan	Feb. 16-17
Gladwin, F. E., Rochester	Jan. 27-28; Feb. 5-9
Godfrey, F. N., Olean	Mar. 4
Gott, F. E., Spencerport	Dec. 7-23; Jan. 4-Feb. 23; Mar. 1-3
Gray, Miss Gertrude A., Toronto, Can.	Dec. 7-23; Feb. 2-25; Mar. 1-4
Gray, H. E., Fort Edward	Mar. 1-4
Green, J. T., Interlaken	Mar. 10
Gregg, R. E., Barnes Corners	Jan. 14
Greiner, F., Naples	Mar. 11
Grennell, O. G., Batavia	Jan. 22
Haines, G. W., Mayfield	Mar. 12
Hall, F. H., Geneva	Jan. 14-26
Hamilton, Dr. M., Delhi	Feb. 1-13
Harper, Nelson, Darien	Jan. 5
Harris, G. W., Baldwinsville	Feb. 4
Hedrick, U. P., Geneva	Jan. 4-5
Heffernan, C. J., Amsterdam	Jan. 6
Hill, Oliver W., Webster	Feb. 5
Hodgkiss, H. E., Geneva	Jan. 19-22
House, S. D., Camillus	Mar. 11
Hull, Phillip N., Albany	Dec. 14-19; Feb. 8-13
Huson, Calvin J., Penn Yan	Jan. 29
Jeannin, John, Jr., West Sand Lake	Dec. 7-19; Jan. 5-28; Feb. 2-24
Jones, C. Edward, Albany	Dec. 8-22; Jan. 5-Feb. 23; Mar. 1-4
Jones, M. P., Ithaca	Feb. 6
Jones, P. D., Mount Morris	Mar. 9
Jordan, Dr. W. H., Geneva	Mar. 1-3
Judd, Mrs. S. N., Canton	Jan. 5-Feb. 2, 5
Katkamier, A. B., Macedon	Dec. 15-23; Jan. 23-30
Larmon, C. W., Albany	Feb. 15-16; Mar. 4
Law, Dr. James, Ithaca	Mar. 2-4
Lyon, H. H., Bainbridge	Feb. 24
Lyttle, E. W., Albany	Dec. 7-11, 18
McCoy, A. J., Gouverneur	Mar. 17
McDonald, E. F., Albany	Dec. 7-16, 21-23; Jan. 4-Feb. 19, 23-24; Mar. 2-4
McLennan, John, Alfred	Mar. 3-4
McVean, Arch., Fort Hill	Jan. 19

TABLE No. 6 —(*Continued*).

Mann, Charles, Middleburg	Dec. 21
Markham, D. C., Port Leyden	Jan. 11
Marks, W. F., Clifton Springs	Mar. 16
Marshall, D. D. T., Albany	Dec. 7-11; Jan. 4-9; Feb. 1-6
Martin, T. E., West Rush	Dec. 7-23; Jan. 4-23, 29-Feb. 4, 8-24; Mar. 1-4
Merrell, A. J., Albany	Dec. 7-23; Jan. 5-Feb. 4, 8-18, 22-24; Mar. 1-4
Millar, Miss Bella, Guelph, Ont.	Dec. 7-22; Feb. 15-25; Mar. 1-4
Miller, A. C., Providence, R. I.	Mar. 9-17
Miller, Miss C. Almar, Webster	Feb. 5
Monroe, Mrs. Geo. E., Dryden	Dec. 7-19, 23; Jan. 4-Feb. 19
Moore, Miss Susan, Seneca	Jan. 30
Moore, Dr. V. A., Ithaca	Mar. 2
Morgan, Director O. S., Alfred	Mar. 1, 3
Murray, Miss Lida, Waverly	Jan. 4-9, 19-22, 25-29
Ostrander, Rev. Dr. A. L., Lyons	Feb. 22
Page, W. S., Linden	Jan. 22
Parrott, P. J., Geneva	Feb. 2-9; Mar. 2-4
Pearson, Commissioner R. A., Albany	Dec. 29; Mar. 3
Pierson, D. H., Fort Hill	Jan. 18
Powell, Geo. T., New York City	Mar. 2-4
Prole, Gilbert A., Batavia	Mar. 3
Prucha, M. J., Geneva	Feb. 1-6
Rice, Prof. J. E., Ithaca	Mar. 1-4
Rogers, Prof. C. A., Ithaca	Mar. 1-2
Rose, Miss Flora, Ithaca	Feb. 4; Mar. 2-4
Rose, Miss Laura, Guelph, Can.	Dec. 7-23
Ross, Prof. H. E., Ithaca	Mar. 2-3
Russell, James, Utica	Mar. 12
Santee, Dr. E. M., Cortland	Dec. 7-19; Jan. 4-Feb. 23; Mar. 1-4
Savage, E. S., Ithaca	Mar. 2
Schoene, W. J., Geneva	Feb. 10-23
Shaver, Chas. A., Albany	Jan. 13-16; Feb. 2-5, 15, 18-19
Shepardson, Prof. Frank L., Hamilton	Feb. 17
Smith, Geo. A., Geneva	Dec. 7-23
Spencer, John W., Westfield	Jan. 4-13
Standart, C. J., Buffalo	Feb. 5
Stephen, John W., Salamanca	Jan. 19; Feb. 4-5
Stevens, F. R., Skaneateles	Dec. 7-18; Jan. 4-Feb. 19; Mar. 2-4
Stevens, Mortimer, Pennellville	Mar. 9-11, 17
Stevens, N. S., Moravia	Mar. 10
Stewart, Chas., Johnstown	Mar. 9-12, 16-17
Stewart, F. C., Geneva	Feb. 1-3, 8-12; Mar. 1-4
Sturgis, Russell, New York City	Mar. 3
Taylor, C. C., Lawton Station	Feb. 5
Taylor, O. M., Geneva	Feb. 3-13
Taylor, Dr. W. J., Ithaca	Dec. 7-19; Jan. 4-21, 25-29
Thompson, J. M., Albany	Dec. 12-23; Jan. 18-22
Tuck, Prof. C. H., Ithaca	Jan. 21-23; Feb. 8-11; Mar. 1-3
Van Alstyne, Edward, Kinderhook	Feb. 2-22
Van Buren, B. D., Lockport	Dec. 7-22; Jan. 4-5, 8-9, 11-21, 25-26, 28-30
Van Rensselaer, Miss Martha, Ithaca	Feb. 4; Mar. 1-4
Van Slyke, Dr. L. L., Geneva	Feb. 4-5
Van Wagenen, Jr., Jared, Lawyersville	Dec. 7-23; Jan. 4-Feb. 25; Mar. 1-4
Vedder, Dr. A. M., Lyons	Feb. 22

TABLE No. 6 —(*Concluded*).

Ward, F. D., Batavia	Dec. 21-23; Jan. 25-27; Feb. 15-19; Mar. 2-3
Warren, Prof. G. F., Ithaca	Feb. 8-13; Mar. 2-4
Wellington, Richard, Geneva	Feb. 15-20
Wells, Mrs. Helen, Syracuse	Dec. 7-19; Jan. 5-23; Feb. 18-24; Mar. 1-4
West, N. D., Middleburg	Mar. 12-17
Whetzel, Prof. H. H., Ithaca	Jan. 22-23; Mar. 1-4
Wiley, F. T., Geneva	Feb. 10-13
Williams, B. C., Batavia	Jan. 22
Williams, Sherman, Albany	Jan. 25-30
Williams, Dr. W. L., Ithaca	Mar. 3
Wilson, Prof. C. S., Ithaca	Mar. 2-4
Wilson, J. K., Geneva	Jan. 11-16, 18-19, 22; Mar. 3-4
Wilson, T. B., Halls Corners	Dec. 7-19; Jan. 5-28; Feb. 2-4, 8-20; Mar. 1-4
Wing, Prof. H. H., Ithaca	Jan. 25-26
Winters, H. B., Waverly	Jan. 4-9, 18-Feb. 6, 24-25; Mar. 1-4
Witter, D. P., Berkshire	Dec. 7-22; Jan. 4-Feb. 25; Mar. 1-4
Woodford, L. L., Pompey	Jan. 7
Woolsey, R. D., Tully	Jan. 11-16
Wright, W. D., Altamont	Mar. 10-17

TABLE No. 7.

MISCELLANEOUS.

(Blanks indicated by asterisk (*) filled out in office; others filled out by secretary of the Conference.)

A. Copy of Conference Report Blank.

STATE OF NEW YORK — DEPARTMENT OF AGRICULTURE.

FARMERS' INSTITUTE CONFERENCE.

*.................... County. Year 1908-09.

Name of chairman.................................... Address..............

Name of secretary.................................... Address..............

* In 1906-07 institutes were held at ....

* In 1907-08 institutes were held at ....

* Next year ...... days of institute work are assigned. Please suggest places where you desire institutes in 1908-09, together with the number of days for each, and the name of the local correspondent *who agrees to serve*.

....

As heretofore, the locality where an institute is held will be expected to furnish a hall, well warmed and lighted, without cost to the State, and without a collection being taken at any institute session. Mention any period between December 1st and March 15th when it would be least desirable to have institutes, and give reason. ....

What are the principal subjects needed on the program? Name them in the order of importance. (See list attached.)

....

Are there one or two persons in your county who have made a marked success in some line of agricultural work, and are able to lecture upon it?

Name. *Address.* *Successful in.*

....

Are there two or three other persons in your county who have made a marked success in some line of agricultural work, and are able to answer questions about it?

Name. ***Address.*** ***Successful in.***

....

If sessions devoted to special topics are desired, please state the fact. ......

....

Give the name of any agricultural organization in your district which is not represented at your conference. (We have the names of all granges.)

....

What are the best hotels near places recommended for institutes? ....

If places recommended for institutes are not on railroads, state how they can best be reached ....

*** The following persons have been invited to your Conference. Please place an "X" before the names of those present and an "O" before those who are absent.**

....

List of Subjects Available for Farmers' Institutes.

Farm home.
Farm community.
Animals, and feeding problems.
Dairy herd.
Milk and its products.
Poultry.
Veterinary subjects.
Insect pests.
Plant diseases.
Fertilizers.
Soils.
Field crops.
Horticulture.
Vegetable growing.
Country schools.
Children's agricultural subjects.
Subjects of special interest to women.
Miscellaneous, general and special subjects.

B. Copy of One-Day Institute Program.

(First page.)

"I know of no pursuit in which more real and important services can be rendered to any country than by improving its agriculture."

— *George Washington.*

STATE OF NEW YORK — DEPARTMENT OF AGRICULTURE.
Raymond A. Pearson, *Commissioner,*
Albany, N. Y.

Farmers' Institute at Manchester.

Tuesday, March 16, 1909,
in Baptist Church.

Conducted by T. B. Wilson.
Local Correspondent, John Q. Wells.

Admission Free.

Every one interested in Agriculture is invited to attend and take part **in the discussions.**

Write out, and place in the Question Box, any proper questions pertaining to Agriculture. Make all questions and remarks short and to the point.

Bring note book and pencil, and use them.

Bring the whole family. Ladies are particularly requested to be present.

(Second page — blank.)

(Third page.)

PROGRAM.

TUESDAY, 10 A. M.

Potato Growing and Spraying	Geo. W. Salisbury
Cabbage from Seed to Harvest	T. B. Wilson, Halls Corners

1:30 P. M.

Question Box.

The Relation of Sod and Tillage to the Apple Orchard	O. M. Taylor, State Experiment Station, Geneva
Fruit Insect Problems	P. J. Parrott, State Experiment Station, Geneva
Saving and Testing of Seed Corn (Illustrated with tester)	Lewis H. Allen

7:30 P. M.

Vocal Solo (Violin obligato by John Hagerty)	Marie Whitney
Fruits for the Farmer's Table	M. F. Pierson
Planting the Home Grounds	T. E. Martin, West Rush
Nature Study	A. B. Katkamier, Macedon

Note.— Dinner and supper will be served by the Christian Endeavor Society in the church basement.

(Fourth page.)

According to the United States Census for 1900, there were 226,720 farms in New York State. The rural population was 1,625,895. The total value of farm property was:

Land and improvements	$551,174,220	
Buildings	336,959,960	
Implements and machinery	56,006,000	
Live stock	125,583,715	
		$1,069,723,895

The total value of the products of New York farms in 1899 was $245,270,600.

The values of the leading farm products according to late reports are as follows:

Cereals —		
Corn	$11,502,000	
Wheat	7,125,000	
Oats	21,139,000	
Barley	1,580,000	
Rye	1,716,000	
Buckwheat	3,981,000	
		$47,043,000
Dairy Products —		
Census year (1900), value of		$55,470,156
Gallons milk produced, 772,799,352		

Butter, dairy, pounds	74,714,376		
Butter, factory, pounds (1905)	58,256,504		
		132,970,880	
Cheese, dairy, pounds	2,624,552		
Cheese, factory, pounds	132,836,482		
		135,461,034	
Other Products —			
Hay			$91,388,000
Potatoes			23,796,000
Hops			880,000
Orchard fruits, 1899		$10,542,272	
Small fruits, "		2,538,363	
Grapes, "		2,763,711	
			15,844,346

New York leads all other states in the values of her dairy products, potatoes, hay and buckwheat.

C. Copy of Two-Day Institute Program.

(First page.)

"I know of no pursuit in which more real and important services can be rendered to any country than by improving its agriculture."

— *George Washington.*

STATE OF NEW YORK — DEPARTMENT OF AGRICULTURE.
Raymond A. Pearson, *Commissioner*, Albany, N. Y.

FARMERS' INSTITUTE AT RUSHVILLE.

MONDAY AND TUESDAY, FEBRUARY 15-16, 1909,
IN MEMORIAL HALL.

Conducted by F. E. GOTT.
Local Correspondent, E. L. MOODY.

ADMISSION FREE.

Every one interested in Agriculture is invited to attend and take part in the discussions.

Write out, and place in the Question Box, any proper questions pertaining to Agriculture. Make all questions and remarks short and to the point.

Bring note book and pencil, and use them.

Bring the whole family. Ladies are particularly requested to be present.

(Second page.)

PROGRAM.

MONDAY, 10:30 A. M.

The Institute	F. E. Gott, Spencerport
How Plants Grow	F. R. Stevens, Geneva
Breeding Horses on the Farm	F. D. Ward, Batavia

1:30 P. M.

Music.
Question Box.
Drainage as Related to Fertility .... Mr. Gott
Music.
Benefits of Crop Rotation .... Mr. Stevens

7:30 P. M.

Question Box.
Instrumental Duet ....Miss Carrie Green and Mrs. Geo. Fitch
Feeding the Farmer's Family .... Miss Gertrude A. Gray, Toronto, Can.
Chorus, "Merrily Goes Our Bark."
Our Rural Schools..........Chas. A. Shaver, Education Department, Albany
Duet and Chorus......................Mrs. Geo. Fitch and Mrs. L. P. Detro

(Third page.)

TUESDAY, 10 A. M.

Question Box.
Problems in the Vineyard..........................E. C. Gillette, Penn Yan
Orchard Management .... Mr. Gott

1:30 P. M.

Question Box.
Vocal Duet ....Misses Faye and Effie Fisher
Economy in Feeding Animals .... Mr. Ward
Vocal Duet .... Mrs. Robert Perry and Mr. Frank Becker
Growing Alfalfa .... Mr. Stevens

7:30 P. M.

Question Box.
Life's Talisman .... Miss Gray
Comparison Between British and American Farm Methods........Mr. Ward

An additional literary and musical program has been arranged.
Music in charge of Miss Carrie Green.

(Fourth page — Same as that of preceding program.)

D. Copy of Institute School Program.

(First page.)

"I know of no pursuit in which more real and important services can be rendered to any country than by improving its agriculture."

— *George Washington.*

STATE OF NEW YORK — DEPARTMENT OF AGRICULTURE.
Raymond A. Pearson, *Commissioner*,
Albany, N. Y.

FARMERS' INSTITUTE SCHOOL.
In cooperation with the
NEW YORK STATE SCHOOL OF AGRICULTURE AT ALFRED UNIVERSITY
AT ALFRED
MONDAY, TUESDAY, WEDNESDAY AND THURSDAY, MARCH 1-4, 1909,
In Firemen's Hall, Chapel Hall, Parish House Hall,
Recitation Rooms and School Building.

Conducted by JARED VAN WAGENEN, JR.
Local Correspondent, PRESIDENT BOOTHE C. DAVIS.

ADMISSION FREE.

Every one interested in Agriculture is invited to attend and take part in the discussions.

Write out, and place in the Question Box, at the general conference at 4.30 daily, any proper questions pertaining to Agriculture. Make all questions and remarks short and to the point.

Bring note book and pencil, and use them.

Bring the whole family. Ladies are particularly requested to be present.

(Second page.)

ANNOUNCEMENT.

All who can do so are especially urged to attend the first evening session when general announcements will be made.

MONDAY.

1:30 to 1:50 — Director Morgan: Special Features of the Agricultural School at Alfred — *Parish House Hall.*
1:50 to 2:30 — Mr. Van Wagenen: Feeding Animals — *Parish House Hall.*
1:50 to 2:30 — Mrs. Wells: Annual Flowers — *Chapel Hall.*
1:50 to 2:30 — Prof. Whetzel: Principles of Plant Disease Control — *Firemen's Hall.*
2:30 to 3:30 — Mr. Powell: The Preparation of Soil for Planting Fruit Trees — *Parish House Hall.*
2:30 to 3:30 — Prof. Fippin: Conditions in New York Requiring Drainage — *Firemen's Hall.*
2:45 to 3:00 — Mr. Jones: Agriculture for Young People — *School Building.*
3:00 to 3:30 — Mrs. Wells: My Garden — *School Building.*
3:30 to 4:30 — Mr. Van Wagenen: The Soil — *Parish House Hall.*
3:30 to 4:30 — Prof. Rice: The Building of a Modern Poultry House — *Firemen's Hall.*
4:30 to 5:30 — Question Box and Conference for Everybody.
7:30 at *Firemen's Hall:*
Music.
Mr. Van Wagenen: Opening remarks.
Music.
President Davis: Address of Welcome and Lecture on Social Phases of Agricultural Education.
Mr. Jones: The Rural School.

(Third page.)

TUESDAY.

9:00 to 10:00 — Mr. Powell: Propagation of Trees and Plants in Relation to Constitutional Quality — *Chapel Hall.*
9:00 to 10:00 — Prof. Rice: Some Problems in the Feeding of Poultry — *Firemen's Hall.*

9:00 to 10:00 — Mr. Stevens: How Plants Feed and Grow — *Parish House Hall.*
10:00 to 11:00 — Prof. C. S. Wilson: Methods of Control for Insect Pests and Plant Diseases — *Parish House Hall.*
10:00 to 11:00 — Prof. Fippin: Principles of Drainage — *Firemen's Hall.*
11:00 to 12:00 — Mr. McLennan: Intensive Farming — *Parish House Hall.*
11:00 to 12:00 — Prof, Warren: Varieties of Grasses and Conditions to Which They Are Adapted — *Firemen's Hall.*
11:00 to 12:00 — Miss Rose: Food — *Chapel Hall.*
11:00 to 12:00 — Dr. Law: Diseases of the Horse — *Recitation Hall.*
1:30 to 2:30 — Mr. Van Wagenen: Feeding Animals — *Parish House Hall.*
1:30 to 2:30 — Mrs. Wells: Perennial Flowers — *Chapel Hall.*
1:30 to 2:30 — Prof. Whetzel: Potato Diseases — *Firemen's Hall.*
2:30 to 3:30 — Mr. Powell: How to Lay Out Land for an Orchard and Methods in the Planting of Trees — *Parish House Hall.*
2:30 to 3:30 — Prof. Fippin: Practice of Drainage — *Firemen's Hall.*
2:30 to 3:30 — Miss Rose: How to Use Recipes — *Chapel Hall.*
2:30 to 3:30 — Dean Cook: Motherhood of the Dairy Cow — *Chapel Hall.*
2:45 to 3:00 — Mr. Jones: Agriculture for Young People — *School Building.*
3:00 to 3:30 — Prof. Warren: Seed Selection — *School Building.*
3:30 to 4:30 — Mr. Van Wagenen: The Soil — *Parish House Hall.*
3:30 to 4:30 — Prof. Rice: Selecting Stock for Breeding with a View to Their Constitutional Vigor — *Firemen's Hall.*
4:30 to 5:30 — Question Box and Conference.
7:30 at *Firemen's Hall:*
Music.
Dean Cook: Our Agricultural Activities and Their Direction.
Music.
Prof. Warren: Land Values and Land Prices in the East and West.

(Fourth page.)

WEDNESDAY.

9:00 to 10:00 — Mr. Powell: Propogation of Trees and Plants with Reference to Increased Power of Production — *Chapel Hall.*
9:00 to 10:00 — Prof. Rice: Some Problems in the Feeding of Poultry — *Firemen's Hall.*
9:00 to 10:00 — Mr. Stevens: Soiling Crops — *Parish House Hall.*
10:00 to 11:00 — Dean Cook: More Cows on Fewer Acres — *Chapel Hall.*
10:00 to 11:00 — Prof. C. S. Wilson: Grafting and Its Relation to Orchard Practices — *Parish House Hall.*
10:00 to 11:00 — Prof. J. K. Wilson: Bacteria in Agriculture — *Recitation Hall.*
11:00 to 12:00 — Mr. McLennan: Intensive Farming — *Parish House Hall.*
11:00 to 12:00 — Prof. Warren: Clovers and Alfalfa — *Firemen's Hall.*
11:00 to 12:00 — Miss Rose: Meat and Other Animal Food — *Chapel Hall.*
11:00 to 12:00 — Dr. Law: Tuberculosis of Cattle — *Recitation Hall.*
1:30 to 2:30 — Mr. Van Wagenen: Feeding Animals — *Parish House Hall.*
1:30 to 2:30 — Mrs. Wells: The Homemaker's Vegetable Garden — *Chapel Hall.*

1:30 to 2:30 — Prof. Whetzel: Diseases of Fruits and Fruit Trees — *Firemen's Hall.*

2:30 to 3:30 — Mr. Powell: Standard and Dwarf Trees; Varieties; the Pruning of Trees — *Parish House Hall.*

2:30 to 3:30 — Dean Cook: Modern Potato Growing — *Firemen's Hall.*

2:30 to 3:30 — Miss Rose: How to Plan Dietaries — *Chapel Hall.*

2:45 to 3:00 — Mr. Jones: Agriculture for Young People — *School Building.*

3:00 to 3:30 — Director Morgan: Nature Study — *School Building.*

3:30 to 4:30 — Mr. Van Wagenen: The Soil — *Parish House Hall.*

3:30 to 4:30 — Prof. Rice: Fattening Poultry — *Firemen's Hall.*

3:30 to 4:30 — Prof. Warren: The Production of Hay — *Chapel Hall.*

4:30 to 5:30 — Question Box and Conference — *Chapel Hall.*

7:30 at *Firemen's Hall:*

Music.

Director Morgan: Three Co-operative Features of the Agricultural School at Alfred

Music.

Prof. Rice: What Young People Ought to Know About Poultry — Illustrated.

(Fifth page.)

THURSDAY.

9:00 to 10:00 — Mr. Powell: Land Value as Affected by Plant Improvement — *Chapel Hall.*

9:00 to 10:00 — Prof. Rice: Marketing Poultry and Poultry Products — *Firemen's Hall.*

9:00 to 10:00 — Mr. Stevens: Making Balanced Rations — *Parish House Hall.*

10:00 to 11:00 — Prof. C. S. Wilson: Small Fruits — *Parish House Hall.*

10:00 to 11:00 — Prof. J. K. Wilson: Bacteria in the Dairy — *Recitation Hall.*

11:00 to 12:00 — Mr. McLennan: Growing Root Crops for Stock — *Parish House Hall.*

11:00 to 12:00 — Prof. Warren: Management of Pastures — *Firemen's Hall.*

11:00 to 12:00 — Miss Rose: Vegetable Food — *Chapel Hall.*

11:00 to 12:00 — Dr. Law: Diseases of Animals Other Than Tuberculosis — *Recitation Hall.*

1:30 to 2:30 — Mr. Van Wagenen: Feeding Animals — *Parish House Hall.*

1:30 to 2:30 — Mrs. Wells: Hints on Home Plants — *Chapel Hall.*

1:30 to 2:30 — Prof. Whetzel: Grain Smuts — *Firemen's Hall.*

2:30 to 3:30 — Mr. Powell: A Higher Standard of Quality in Apples — *Parish House Hall.*

2:30 to 3:30 — Mr. Stevens — Advantages of a Definite Rotation — *Firemen's Hall.*

2:30 to 3:30 — Miss Rose: How to Plan Dietaries — *Chapel Hall.*

2:45 to 3:00 — Mr. Jones: Agriculture for Young People — *School Building.*

3:00 to 3:30 — Prof. Rice: Hard Work and Easy Work — *School Building.*

3:30 to 4:30 — Mr. Van Wagenen: The Soil — *Parish House Hall.*

3:30 to 4:30 — Prof. Rice: Poultry Breeds and Judging — *Firemen's Hall.*

4:30 to 5:30 — Question Box and Conference — *Chapel Hall.*
7:30 at *Firemen's Hall:*
Music.
Mr. Powell: The Relation of Cities to Rural Prosperity.
Music.
Mr. Van Wagenen: The Education of the Farmer.

(Sixth page.)

SPEAKERS.

H. E. COOK, Canton,
Dean of the New York State School of Agriculture at St. Lawrence University.
BOOTHE C. DAVIS, Alfred,
President of Alfred University.
E. O. FIPPIN, Ithaca,
Professor of Soil Investigations, New York State College of Agriculture at Cornell University.
C. EDWARD JONES, New York,
Farmers' Institute Lecturer, State Department of Education.
JAMES LAW, Ithaca,
Ex-Director of the New York State Veterinary College at Cornell University.
JOHN MCLENNAN, Alfred,
Superintendent of Farm, New York State School of Agriculture at Alfred University.
O. S. MORGAN, Alfred,
Director of the New York State School of Agriculture at Alfred University.
GEORGE T. POWELL, New York,
President of the Agricultural Experts' Association.
JAMES E. RICE, Ithaca,
Professor of Poultry Husbandry, New York State College of Agriculture at Cornell University.
FLORA ROSE, Ithaca,
Lecturer in Department of Home Economics, New York State College of Agriculture at Cornell University.
F. R. STEVENS, Geneva,
Farmers' Institute Lecturer, State Department of Agriculture.
JARED VAN WAGENEN, JR., Lawyersville,
Farmer and Farmers' Institute Lecturer; Conductor.
G. F. WARREN, Ithaca,
Professor of Farm Crops, New York State College of Agriculture at Cornell University.
HELEN WELLS, Syracuse,
Farmers' Institute Lecturer.
H. H. WHETZEL, Ithaca,
Professor of Plant Pathology, New York State College of Agriculture at Cornell University.
C. S. WILSON, Ithaca,
Assistant Professor of Horticulture, New York State College of Agriculture at Cornell University.
J. K. WILSON, Geneva,
Assistant Bacteriologist, New York Agricultural Experiment Station.

(Seventh page — Same as fourth page of preceding programs.)

E. Copy of Conductor's Report Blank.

STATE OF NEW YORK — DEPARTMENT OF AGRICULTURE.

CONDUCTOR'S REPORT OF INSTITUTE.

Held at ...., ... County,
on ....
.... Conductor.

Send with this a copy of program, showing changes, if any, and reasons for them; number of minutes occupied by each speaker for his formal address and number of minutes occupied in discussing each address.

Attendance: First session ....; Second session ....;
Third session ....; Fourth session ....; Fifth session ....;
What was the principal reason for attendance not being larger? ....
....
Was interest good? ....
Was meeting satisfactory? ....
What subjects are the people most interested in? ....
....
Where do you think the next institute for this locality should be held?
....
Is the local correspondent satisfactory? .... If not, whom do you suggest? ....
(Give full name and P. O. address)
....
Give names and addresses of those most interested and subjects in which they are interested ....
....

F. Copy of Local Correspondent's Report Blank.

STATE OF NEW YORK — DEPARTMENT OF AGRICULTURE.

Please fill out and mail promptly in the enclosed envelope to the Commissioner of Agriculture, Albany, N. Y.

CORRESPONDENT'S REPORT OF FARMERS' INSTITUTE.

Held at ...., ... County,
on ....
....
Local Correspondent.

....
Number present: First session ....; Second session ....;
Third session ....; Fourth session ....; Fifth session ....

What was the principal reason for the attendance not being larger?

....

Was the interest good? ....

Was the meeting satisfactory? ....

What subjects are the people most interested in? ....

....

Where do you think the next meeting for this locality should be held?

....

What speakers, if any, should not be sent again?

....

What crops are grown? Name in order of importance.

....

What is the range of value per acre of farm lands in your vicinity?

....

Is the tendency downward or upward in price? ....

Is there any market for farms? ....

Have the Institutes been of value to the farmers in your vicinity? State an instance or instances.

....

G. Copy of Slip Distributed at Institutes and used to send Bulletins from the Farmers' Institute Office.

STATE OF NEW YORK — DEPARTMENT OF AGRICULTURE.

FARMERS' INSTITUTES.

SEASON 1908-9

The Department wishes to have the names and addresses of farmers who have attended the institutes, and subjects in which they are most interested.

(WRITE PLAINLY)

Institute at ....; *County* ....

Name .... *Address* ....

Agricultural Subject in which most interested ....

A HISTORY OF FARMERS' INSTITUTES

IN

NEW YORK STATE

A History of Farmers' Institutes in New York State

By D. P. Witter, Farmers' Institute Conductor

Many changes have occurred since the beginning of the institute work and, until the present writing, there has been no history which brought the subject down to its latest form of management. Realizing this, as well as the importance of securing and placing on record the facts regarding the development of this educational movement while those best cognizant of it were still living, the Commissioner of Agriculture has asked me to write such a history.

It would be pleasant for me to speak at length of individuals who have performed valiant service to the success of the Farmers' Institutes. It must, however, be remembered that this is not a biography, but a history of one branch of the educational movement in this state, which has for its object the elevation of country life.

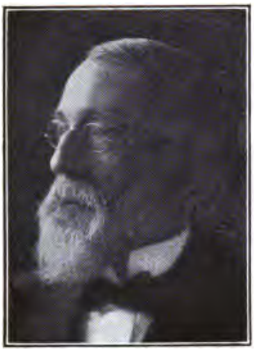
In 1874, Professor I. P. Roberts was called from the State College of Agriculture and Mechanic Arts of Iowa to become Dean of the New York State College of Agriculture at Ithaca. Professor Roberts had been greatly interested in studying the conditions which, through the efforts of the state college, had caused the awakening of interest in farm development along scientific lines throughout Iowa. It was but natural that he should compare these with conditions existing in New York State. Of this he says: "I came to Cornell in February, 1874, and soon discovered that the farmers of the state had no vital interest in their college of agriculture. In the early, gloomy days at Cornell I naturally went back in spirit and thought to the sunny prairies of Iowa for light and help. I had been actively connected with the first

Farmers' Institute in the United States, which was conceived and carried out by the president of the Iowa Agriculture College, the late A. S. Welch. Some twelve institutes were held during the winters from 1871 to 1873. All this being fresh in my mind when I came to Cornell, I naturally thought a Farmers' Institute might call the attention of the New York farmers to the college, especially if it were held at Cornell. After much correspondence with a number of such leading farmers as I had then discovered, an institute program was printed and sent forth to what would now be considered a limited number of public spirited, progressive farmers of the state, but who were then unknown to me."

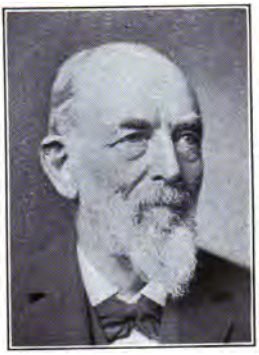
Professor Roberts had the assistance of J. S. Woodward of Lockport in carrying out his ideas. Mr. Woodward was a prominent member of the Western New York Horticultural Society and was also associated with the *Rural New Yorker.*

Although the work which led up to the first institute was difficult and at times discouraging, in August, 1885, there was a meeting at Ithaca of what was called the Farmers' Scientific Agricultural Workers. This was, more correctly speaking, a meeting of the teachers of agriculture. There was a large attendance and a very interesting meeting. A conference was held by Professor Roberts, Mr. Woodward and President Adams of Cornell University, at which it was determined that a Farmers' Institute should be held the following winter. Returning to New York City, Mr. Woodward endeavored, through the columns of the *Rural New Yorker,* to stimulate interest in institute work.

"Thus", writes Professor Roberts, "the agricultural stork, which now comes to every farmer's house in this great state of New York, came first to the College of Agriculture at Cornell." The institute was held in Morrill Hall, Cornell University, in February, 1886, and lasted three days (16, 17, 18). The Honorable Harris Lewis of Herkimer was made chairman. People came from all parts of the state and even from other states to attend, so great was the interest awakened. The report of this first institute which we give below is taken from the file of the *Ithaca Daily Journal.*



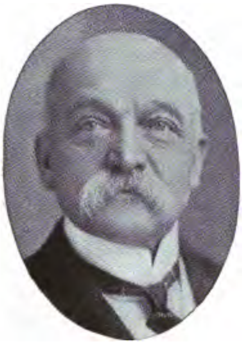
Professor I. P. Roberts.
Cornell College of Agriculture.



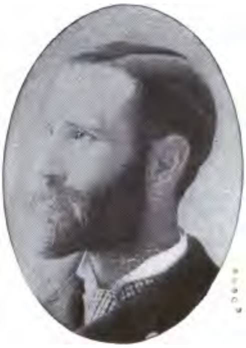
J. S. Woodward.
Director 1887–1888.

J. F. Converse.
Director 1889–1890.

George T. Powell.
Director 1890–1893.



George A. Smith.
Director 1893–1896.



F. E. Dawley.
Director 1896–1908.

Fig. 1.— Early Institute Workers.

FARMERS' INSTITUTE.

Held at Cornell University February 16, 17, 18, 1886.

TUESDAY, FEBRUARY 16.

MORNING.

Institute opened by informal meeting in faculty room.

Visitors were entertained by President Adams and Professor Roberts.

It was said that the purpose of the Farmers' Institute was to ask kindly criticism from the farmers and to connect them more closely with the University.

Hope was expressed that an annual meeting might be held, also six or seven institutes throughout the State.

12 M. Institute members attended Professor Anthony's lecture in Physics.

AFTERNOON.

2:00 Fertilizers (Paper read by Professor Comstock).— Ara Campbell, Owego, N. Y.

Methods of Cornell University in Entomology.— Professor Comstock, Cornell University.

4:30 Institute visited Entomological Laboratory and later the Gymnasium.

EVENING.

Library Hall.

Plea for Scientific Agriculture.— President Adams.

WEDNESDAY, FEBRUARY 17.

MORNING.

Room K, Morrill Hall.

Honorable Harris Lewis, Herkimer, N. Y., former President of State Agricultural Society, presiding.

Corn Feed.— Professor Caldwell, Cornell University.

Brains and Manners on the Farm.— J. S. Woodward of *Rural New Yorker.*

A talk on Cornell University methods of teaching agriculture. Explanations of free scholarships, and how to obtain their benefits.— Professor Roberts.

Visit to University barns.

12 M. Lunch served in Assembly Room, Morrill Hall.

AFTERNOON.

Botanical Lecture Room, Sage.

2:30 James McCann, Elmira, presiding.

Our Stock.— Professor Roberts.

Our Present Knowledge of the Silo and its Products.— Major H. E. Alvord, Director of Houghton Farm, Orange County, N. Y.

The Jersey, the Model Farm and Dairy Cow.— J. C. Sibley of Sibley & Miller.

Importance of Fungoid Diseases of Plants.— J. C. Arthur of Geneva Experiment Station.

4:30 Visit to Botanical Department and Conservatory.

EVENING.

Library Hall.

Susceptibility of the Horse and Other Animals to Climate, Soil, Development and Breeding.— W. B. Powell of Powell Bros.

THURSDAY, FEBRUARY 18.

MORNING.

Room K, Morrill Hall.

Professor Roberts elected chairman and Major H. E. Alvord, permanent secretary.

Shropshire Sheep.— J. L. Stone, Waverly, Pa.

Shropshire Sheep as Producers of Early Lambs.— J. S. Woodward.

Prevention of Diseases Which Exist Among Domestic Animals.—Professor James Law of Cornell University.

Bee Culture.— W. A. Bean, McGrawville.

Dr. Law discussed legislative and government control of contagious and infectious diseases of domestic animals, advocating United States government control, because state control would be inadequate to deal with importations.

Resolutions were presented by Colonel F. D. Curtis, State Statistician for the United States government, and were adopted by the institute.

Resolutions recommended the investigation and control, through the United States Department of Agriculture, of contagious and infectious diseases among domestic animals, special mention being made of hog cholera, swine plague, and trichinæ in swine.

Resolution also recommended revenue taxation and goverment inspection of imitation butter compounds.

Major Alvord suggested that the Legislature should establish a State Board of Agriculture, with power and weight to bring these matters before Congress.

A committee of seven representative farmers was appointed by the chairman to formulate a plan to be presented to the Legislature for the establishment of a State Board of Agriculture.

12 M. Lunch served by Goddard in Assembly Room.

AFTERNOON.

The Holstein Cow and What She is Good for.— Mr. Smith of Smith, Powell & Lamb, Syracuse, N. Y.

Feeding.— Colonel F. D. Curtis, Saratoga, N. Y.

The Dairy.— L. P. Smith, Trumansburg, N. Y.

Remarks by Honorable Harry Lewis and other members of the institute.

Vote of thanks, moved by Colonel Curtis to Professor Roberts and his associates for the zeal in the organization and perfection of the Farmers' Institute at Cornell University.

Vote carried unanimously, closing the first Farmers' Institute at Cornell University.

The headquarters of the institute were at Morrill Hall, and evening sessions were held in Library Hall on Tioga Street, Ithaca, N. Y. The registration at the institute was given as 85 persons during the three days."

In September, 1886, at Utica, a sub-committee appointed by the State Agricultual Society executive committee, reported plans which the executive committee, in session in December of the same year, adopted. This report called for the holding of three Farmers' Institutes at which the addresses should be on subjects of special interest to farmers, followed by discussions of the different topics. The first of these was held at Lockport, January 13 and 14, 1887; the second at Ithaca, February 16, 17 and 18; the third at Oswego, March 1 and 2. Funds to the amount of $1,050 had been appropriated for this purpose by the State Agricultural Society. The committee in charge of this fund was composed of L. T. Harrison, Major Henry E. Alvord and J. S. Woodward. At Mr. Woodward's suggestion, President McCann was named as another member and was made chairman of the committee. This was the first institute committee. At the close of the Oswego institute, this committee reported that there were still sufficient funds to permit of their holding two more institutes, and one was held at Batavia, March 15 and 16, the other at Schenectady, March 25 and 26.

Great care was taken in arranging the programs for these institutes. It was the aim of the committee to provide the best possible talent and to so arrange the programs that the farmers would receive the most helpful information.

In addition to the speakers already mentioned there were engaged for this series such noted agriculturists as E. S. Goff, Experiment Station, Geneva; W. A. Armstrong, Editor *Husbandman,* Elmira; Professor A. J. Cook, Agricultural College, Michigan; Professor L. B. Arnold, Rochester; Mrs. E. Taylor, Johnsons Creek; J. K. Brown, State Dairy Commissioner; James Wood, Mt. Kisco; E. H. Libby, New York City; Dr. E. Lewis Sturtevant, Director State Experiment Station, Geneva; Professor

A. N. Prentiss, Cornell University; Honorable Edwin Willets, President Agricultural College, Michigan; W. H. Gilbert, Richland; Mason C. Weld, Closter, N. J.; Professor C. S. Plumb, Geneva; Dr. J. A. Lintner, State Entomologist; Senator H. R. Low, Middletown; Professor M. E. Perkins, Union College, Schenectady, and Lieutenant-Governor E. F. Jones.

The excellence of the form of presenting the work is shown by the fact that the programs prepared since have practically followed its construction, the only notable change being in the appointment of a conductor to take charge of the work instead of the election of a local chairman for each session of an institute. The discussions following the lectures and the question box have been incorporated in all of the later programs.

So great was the success of this series of institutes, that before the close of the State Legislature of 1887, the sum of $6,000 was appropriated by it for the carrying on of the work. This sum was placed under the management of the State Agricultural Society. All this was not gained without a struggle, as there were conflicting opinions regarding the demand for such a movement. J. S. Woodward headed the faction which advocated institute work and to his untiring efforts the success of the project is largely due.

In 1887 Mr. Woodward was Secretary of the State Agricultural Society and in the fall was appointed Director of Farmers' Institutes. Twenty institutes were held between December 20, 1887, and March 14, 1888. In December of 1888, Mr. Woodward suffered a stroke of paralysis, and at a special meeting of the executive committee of the State Agricultural Society, held at Syracuse, December 13, 1888, W. Judson Smith was appointed corresponding secretary pro tem. In taking up Mr. Woodward's institute work he was assisted by Colonel F. D. Curtis of Charlton, Saratoga County. Some time during the summer of 1889, J. F. Converse of Woodville was appointed Director of Farmers' Institutes which office he filled for the season of 1889-90. While director, he secured the services of Charles Jennings of Bellville, N. Y., as reporter of Farmers' Institutes. His services were a prominent factor in helping to overcome opposition to the institute, which in the early days was, in many places, very strong.

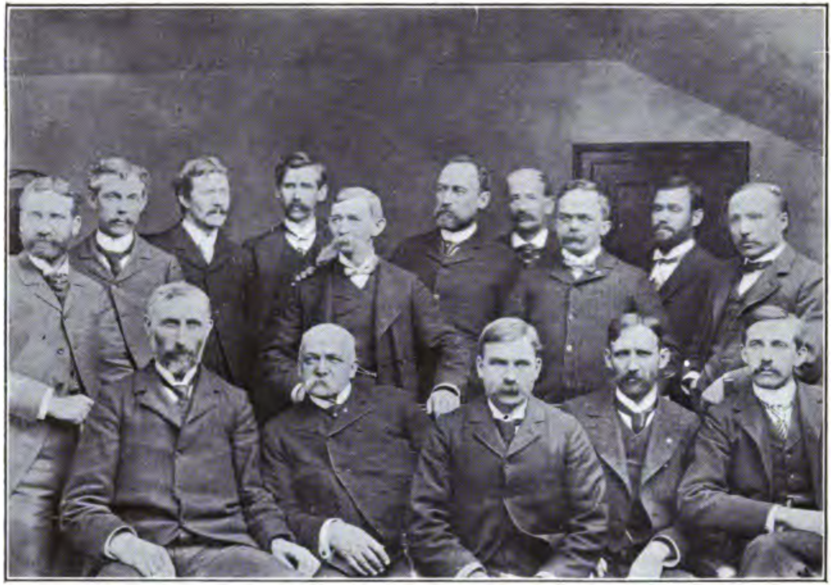


FIG. 2.— INSTITUTE WORKERS OF 1899.

Standing, from left to right: Dr. L. L. Van Slyke, Prof. S. A. Beach, F. H. Hall, Prof. V. H. Lowe, H. Van Dreser, E. Van Alstyne, F. D. Ward, F. Converse, H. A. Harding, Dr. W. H. Jordan. Seated, from left to right: H. E. Cook, G. A. Smith, Prof. J. E. Rice, F. E. Dawley, F. C. Stewart.

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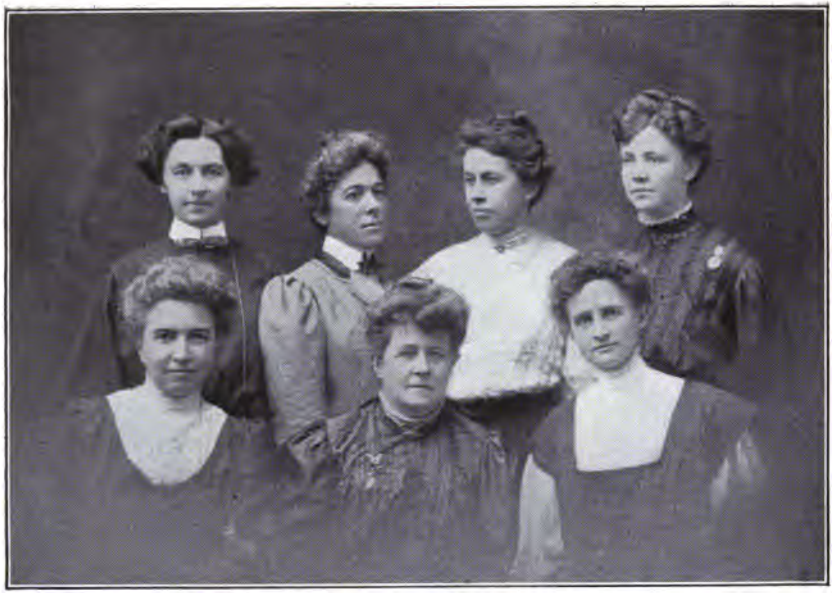

FIG. 3.—INSTITUTE WORKERS AT THE WOMEN'S INSTITUTES OF 1907.

Standing, from left to right: Matie J. Dann, Harriet M. Mills, Cora Graham, Gertrude A. Gray. Seated, from left to right: Martha Van Rensselaer, Helen Wells, Flora Rose.

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For several years it was often difficult to find a paper in the vicinity where the institute was being held that would publish an account of it, and if the editor accepted the manuscript furnished, it was often rendered worthless by the matter omitted.

George T. Powell of Ghent succeeded Mr. Converse as director, receiving his appointment during the summer of 1890. In the winter of 1890–91, fifty-two institutes were held under his direction. These were conducted in fifty out of the fifty-six counties in which institute work is carried on. Mr. Powell saw the need for special lectures upon widely diverse topics, and began arranging programs and engaging speakers to meet this condition. Dairy institutes were held in the dairy districts; horse breeding was given prominent attention where this branch of farming was most extensively carried on, and at one of these meetings it is said that 3,000 people were in attendance. Mr. Powell was one of the first of the institute workers to advocate agricultural training in the public schools, suggesting the study of natural sciences that were related to farm life.

The close of Mr. Powell's administration brings us to the time of the enactment of the law which established the State Department of Agriculture, under whose authority the Farmers' Institutes have since been conducted. The educational venture of Farmers' Institutes had proved a success. This fact was recognized and the Legislature made annual appropriations for the work.

The Department of Agriculture was established by law in the winter of 1893. Under section 2, chapter 338, of the Laws of 1893, George A. Smith, of Frankfort, was appointed Director of Farmers' Institutes by Fred C. Schraub, Commissioner of Agriculture. Mr. Smith was the first director appointed by the new department. One of the improvements made during his administration was the introduction of the "lap-over" meetings, as meetings held by the conductor's assistant are called. Where seemingly but little attention had been paid to arranging the dates of institutes so that those in adjoining counties should follow consecutively, Mr. Smith inaugurated the practice of holding institutes in smaller towns with shorter distances between them, which economized in both time and expense. This policy is still continued. In 1894 Mr. Smith, with the aid of Dr. L. L. Van Slyke, Chemist, State Experiment Station, Geneva, published a circular giving the composition and use of commercial fertilizers, also one giving the composition and use of the different feeding stuffs. These were distributed free at the institutes.

F. E. Dawley of Fayetteville was appointed director to succeed Mr. Smith, August 1, 1896, by Charles A. Wieting, Commissioner of Agriculture. Mr. Dawley held the office for twelve years, being the first to retain it for a period of time sufficient to inaugurate and carry out many reform policies. His long training in the work made him eminently fitted for the position. He arranged for a normal institute which was held in 1899, at the State Experiment Station at Geneva. The time spent proved so valuable to the work, that each year since a similar institute lasting from three to six days has been held. The time has been divided equally between the State College at Ithaca and the State Experiment Station at Geneva. So widespread was the interest in this plan that at the institute in 1903 there were present representatives from eleven states and provinces. Several states have adopted this plan and are now holding annual normal institutes.

At the suggestion of Mr. Dawley, representatives from the State Education Department were given places on the institute programs. Later a bill was enacted which provided for the appointment of three men who should represent the Education Department and whose duty it should be to lecture before Farmers' Institutes on subjects pertaining to rural school improvement. The syllabus in use in the rural schools in this state is the direct outcome of the cooperation of the Education Department with the Bureau of Farmers' Institutes.

At the expiration of Mr. Wieting's term in April, 1908, Governor Hughes appointed Professor Raymond A. Pearson of Cornell University as Commissioner of Agriculture. Mr. Dawley resigned from the position of director in May, 1908, since which time the work has been managed directly from the commissioner's office, the different conductors being given increased authority in respect to the arrangement of meetings in their respective districts. During the first few months of this new plan the office details were attended to by A. R. Mann, the commissioner's secretary, and since his resignation they have been in charge of Royal Gilkey.

In 1908, Commissioner Pearson called a conference of leading agricultural instructors in the state. To this were invited L. H. Bailey, Dean of the State Agricultural College; W. H. Jordan, Director of the State Experiment Station; H. E. Cook, Dean of the State Agricultural School at Canton; F. N. Godfrey, Master of the State Grange; the conductors of Farmers' Institutes and others who had been for a number of years prominently identified with the work. Each was asked to offer suggestions which, in the light of his experience, he considered essentially important. One result of this conference was the changing of the policy of holding separate institutes for women, as had been done during the two previous years. While recognizing the need and value of special lectures devoted to women on the farm, and desiring to increase the efforts of the institutes in their behalf, it was the belief of a majority of those attending the conference that this work should be done in the regular institute. It seemed of nearly equal importance that the men as well as the women should hear lectures pertaining to the farm home. It is impossible to enumerate all the benefits derived from this conference, but it has had a decided influence in the shaping of many of the policies of the department.

Before locating the institutes for 1908–9, the commissioner conceived the idea of giving the farmers an opportunity to suggest places where institutes should be held and to recommend subjects upon which lectures would be most appreciated. To accomplish this, county conferences were held throughout the state. To those conferences were invited the presidents of agricultural societies, masters of granges, local correspondents and representatives from any other organizations pertaining to farm interests. This plan, which was a sort of "home rule" measure, gave the people a voice in the arranging of the institute programs and proved of such great value in advancing the work that it is being continued.

The district-county plan, which was recommended by the writer, was adopted in 1908 as one of the policies of the department. By this plan the state is divided into four districts, each district under the charge of a conductor. The districts are now as follows:

District No. 1, Jared Van Wagenen, Jr., Lawyersville, in charge, comprises the counties of Albany, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Madison, Montgomery, Oneida, Onondaga, Schoharie and St. Lawrence.

District No. 2, Edward Van Alstyne, Kinderhook, in charge, comprises the counties of Clinton, Columbia, Dutchess, Essex, Nassau, Orange, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Suffolk, Ulster, Warren, Washington and Westchester.

District No. 3, D. P. Witter, Berkshire, in charge, comprises the counties of Allegany, Broome, Cattaraugus, Chautauqua, Chemung, Chenango, Cortland, Delaware, Otsego, Schuyler, Steuben, Sullivan, Tioga, Tompkins and Yates.

District No. 4, Fred E. Gott, in charge, comprises the counties of Cayuga, Erie, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Oswego, Seneca, Wayne and Wyoming.

Since the division of the state into districts, the principal policies of the work are determined in conferences at which the Commissioner of Agriculture, the conductors, and the alternate or assistant conductors, namely, George A. Smith, Professor C. H. Tuck and T. B. Wilson, meet and outline the work, and assign the speakers for the different districts. Each conductor holds annual conferences in every county in his district, arranges the programs and, with the aid of an assistant, conducts the institutes.

Believing that the farmers living in sections removed from the State College of Agriculture should have more advanced instruction than can be given in the regular institute, Commissioner Pearson, in the spring of 1909, arranged for three institute schools. These were held at Delhi, Delaware County, Spencerport, Monroe County and Alfred, Allegany County, March 1 to 4 inclusive. There were about sixteen speakers at each place. Two and sometimes three lectures were carried on at the same time in as many different halls. Subjects pertaining to the home and school were made prominent features. So great was the success of the undertaking that ten such institute schools were held in the winter of 1909–10 and the policy is being continued.

After the death of Mr. Jennings, reporter of Farmers' Insti-

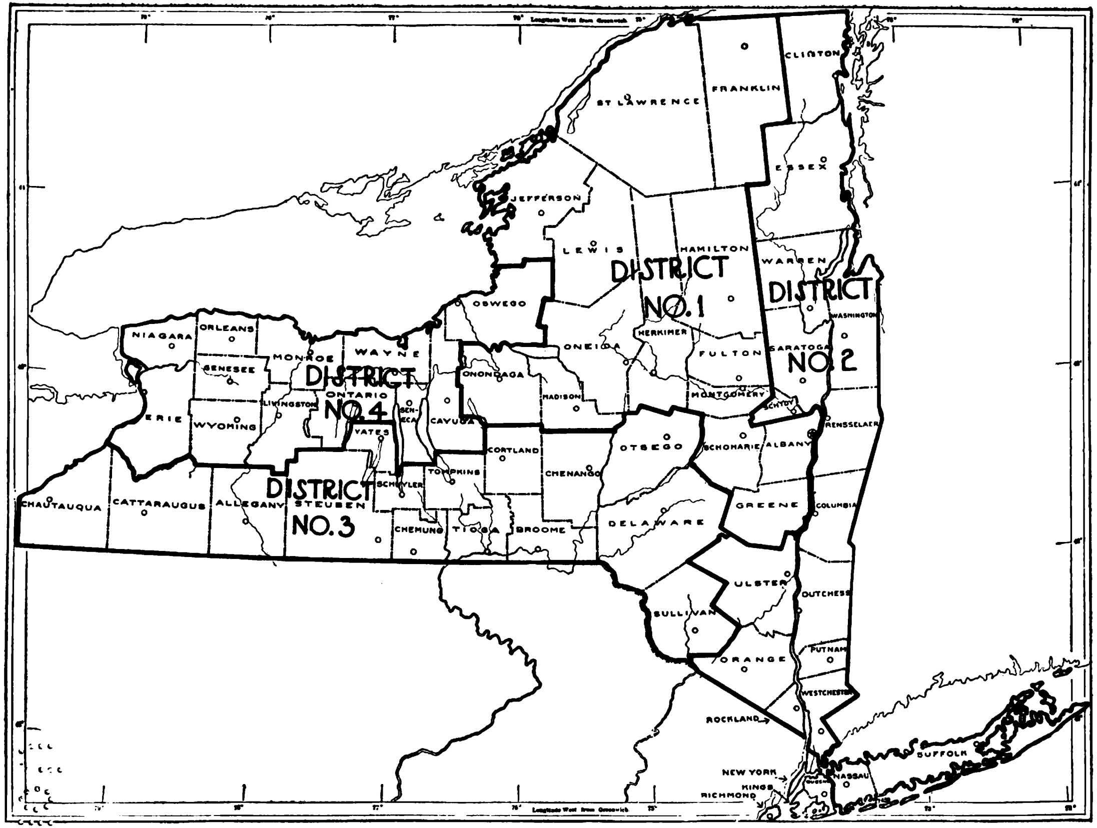


FIG. 4.— MAP OF NEW YORK STATE SHOWING INSTITUTE DISTRICTS.

tutes, several different persons had charge of the work for short periods, until, in 1904, it was taken up by Miss Matie J. Dann of Walton. Miss Dann was given charge of the press work established in the Albany office soon after the beginning of the present commissioner's term, but illness compelled her to retire at the beginning of the second year. This work is now in charge of Miss Margaret C. Ennis of Pattersonville.

Soon after the institute movement was established there came into the work many younger persons among whom may be found: H. E. Cook, Dean of the State Agricultural School at Canton; James E. Rice, Professor of Poultry Husbandry, Cornell University; George A. Smith, Dairy Expert, State Experiment Station, Geneva; A. R. Eastman, Waterville; F. E. Dawley, Fayetteville; S. D. Willard, Geneva; C. E. Chapman, Freeville; Edward Van Alstyne, Kinderhook; Jared Van Wagenen, Jr., Lawyersville; Frank A. Converse, Woodville; Henry Van Dreser, Cobleskill; Dr. C. D. Smead, Logan; John Jeannin, Jr., West Sand Lake; Frank D. Ward, Batavia; A. W. Litchard, Rushford; D. P. Witter, Berkshire; John Gould and T. B. Terry of Ohio. Among the women who have been longest in the service may be named: Mrs. B. B. Lord, Sinclairville; Mrs. S. N. Judd, Canton; Miss Martha Van Rensselaer, Cornell University; and Mrs. Helen Wells, New York City. These, and scores of others who have labored with them, built upon the foundation already laid a structure that is having a mighty influence upon the rural sections of the state. Their work has not only helped the farmer to solve financial problems, but it has been a great moral and social uplift as well.

From the beginning of the institute movement to the present time the President of Cornell University, members of the faculty of the New York State College of Agriculture, and the Director of the State Experiment Station at Geneva, with his staff of workers, have given earnest support to the Farmers' Institutes, and are entitled to much credit for its success.

Professor James E. Rice has kindly furnished a record of the lectures he delivered in the institutes, previous to 1903, and the states he visited in the capacity of lecturer. This record is given so the reader may know the variety of subjects covered by a single person and the extent of the work.

SUMMARY OF INSTITUTE WORK UP TO OCTOBER 1, 1903.

James E. Rice.

SUBJECTS	N. Y.	MD.	N. J.	PA.	R. I.	CONN.	MINN.	TOTAL
Poultry Keeping	373	41	53	1	4	2	23	497
Feeding Farmer's Family	84	5	12	....	....	....	2	103
Fertility Problems	106	23	15	....	....	....	....	144
Small Fruits	83	6	10	....	....	....	1	100
Vegetable Gardening	136	1	5	....	....	....	23	165
Care of Apple Orchard	30	1	8	....	....	....	....	39
Spraying	37	....	9	....	....	....	....	46
Potato Growing	2	....	....	....	....	....	....	2
Silo	5	1	....	....	....	....	....	6
Growing Corn	5	1	....	....	....	....	....	6
Flower Garden	5	....	....	....	....	....	....	5
Marketing Farm Products	7	2	....	....	....	....	....	9
Farming with Lead Pencil	2	....	....	....	....	....	....	2
Economy of Buying Feed	1	....	....	....	....	....	....	1
Dairying	....	1	....	....	....	....	....	1
Farm Management	....	....	1	....	....	....	....	1
The Grange	1	....	....	....	....	....	....	1
Good Roads	3	....	....	....	....	....	....	3
Advantages of Farm Life	....	1	....	....	....	....	....	1
Value of Farm Institutes	1	....	....	....	....	....	....	1
Experiences in Maryland	1	....	....	....	....	....	....	1
Total	882	83	113	1	4	2	49	1134

Thus far, this historical sketch has dealt with the organization of the Farmers' Institute movement, the policy of the different administrations and the names of those most prominent as conductors and lecturers. Let us now consider some of the conditions which created the demand for the work, together with its progress as a whole.

For ten years previous to holding the first institute, general agriculture had been very much depressed in the state. The lack of sufficient tillage and wasting of farm manures had gradually depleted the soil of its most readily available plant food, and crop production had fallen below a paying basis on a large number of farms. So many unprofitable cows were kept and the care and general practice of feeding was such that the average milk production per cow was about 3,000 pounds annually. Under these distressing conditions many of the brightest boys and girls were leaving the farms for the cities and towns, to secure employment which would bring a greater reward for their labor. There were, of course, exceptions but these conditions generally prevailed.

The following quotation is taken from the report of the executive committee of the State Agricultural Society for the year 1887: "That farming in this state is greatly depressed no one can doubt, but that certain wide-awake, progressive farmers are making money, notwithstanding this depression, proves that it can be done. Therefore, to spread a knowledge of progressive, scientific agriculture among the farmers is a work than which no other can be more worthily prosecuted by the executive committee."

The following is taken from an address by the Honorable Josiah K. Brown, State Dairy Commissioner, before the New York State Dairymen's Association, in December, 1888. An investigation had brought out the fact that during the previous year, 407,810 cows in the state, owned by 30,746 patrons of cheese factories, had produced only an average of 3,034 pounds of milk per cow.

"I have neighbors whom I see nearly every day that I know are wearing themselves out in a fruitless attempt to stand up against the mortgage on the farm. And the reason that this is so is that a large percentage of their dairies are these three-thousand-and-thirty-four-pounds-of-milk cows. I was never so sadly impressed as I have been since these facts came to my knowledge, to know that this grandest and greatest agricultural industry was in such a condition as this. That men who work from four o'clock in the morning until nine o'clock at night on their farms find it impossible to make money enough to pay the legitimate and ordinary expenses of the family. * * * I believe this condition of things can be remedied; that this cloud can be lifted from the dairymen of this state, and that relief can come to this great industry and to the people engaged in it. That the dairy farmers and their families should persistently go on year after year wasting their energies and contending against conditions that I have referred to is indeed as lamentable as it is true."

Some of the results accruing from the work of the Farmers' Institutes may be found in a report of the executive committee of the State Agricultural Society in 1892:

"There is substantial evidence of a general improvement all along the line of agriculture in this state, as the result of the work done through the medium of the Farmers' Institutes. The dairy interest, which has been so seriously depressed, is showing unmistakable signs of improvement in the better care that is being given to the herds generally, in saving them from so much exposure, in more intelligent feeding, by properly combining foods and in the more skillful handling of dairy products. * * * A noticeable improvement has been made in the manner of saving and applying 'stable manures,' the losses from which have been immense heretofore, and have been among the primary causes of much unprofitable farming of late years."

The attitude of the farmers toward the State Agricultural College in these early days has already been referred to by Professor Roberts. To-day the attitude of the farmers toward the college may be measured by the large appropriations from the state made for the institution, and the increasing demand for room by the young men and women who are asking for a training there. On April 27, 1907, the present college buildings, which cost $250,000, were dedicated. In 1910, the Legislature made appropriations to the amount of $355,000, to enlarge the college in order to make room for those seeking admission.

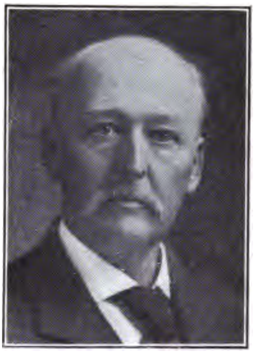
We would not wish to fail to give due prominence to the help which cooperation of the farmers with the institute workers has been in achieving the improvement of soils and conditions of the farms of the state. Without the practical application of the ideas advanced by the institute lecturers, the whole plan would have been rendered useless. Not always was it easy for the agriculturist to revolutionize his methods and direct them along new and unfamiliar lines. Often great expense had to be incurred and years of waiting endured before the results proved the success of the venture. But the eagerness with which every idea was grasped, and, if possible, acted upon has been of the greatest encouragement to those in charge of the work. This year the demand for institutes was much greater than could possibly be granted. To the farmers of the state, for their willingness to give practical, scientific farming a test, the department is glad to concede great praise.

Jared Van Wagenen.
Conductor.

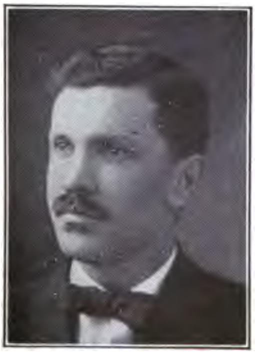
D. P. Witter.
Conductor.

Edward Van Alstyne.
Conductor.

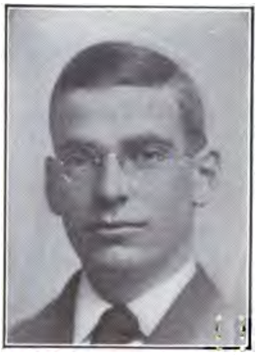
F. E. Gott.
Conductor.



T. B. Wilson.
Alternate Conductor.



C. H. Tuck.
Alternate Conductor.



Royal Gilkey.
Office Assistant.

Fig. 5.— Farmers' Institute Workers of 1909.

Under better tillage and the better adaptation of plants to different soils, the better care and application of farm manures, and a more intelligent use of commercial fertilizers, the land is rapidly becoming more productive. The better selection of the dairy cow, with better feed and care have caused an increase of fully 50 per cent. in the production of milk per cow during the past 25 years. The production of fruit, poultry, alfalfa and almost every branch of New York State agriculture has made wonderful advancement since the first institute held in 1886. One can scarcely measure the improvements in practical agriculture which have been made since that time.

Appropriations for the maintenance and extension of Farmers' Institutes made by the State Legislature have been as follows:

1887	$6,000
1888	10,000
1889	10,000
1890	10,000
1891	10,000
1892	15,000
1893	15,000
1894	15,000
1895	15,000
1896	15,000
1897	15,000
1898	20,000
1899	$20,000
1900	20,000
1901	20,000
1902	20,000
1903	20,000
1904	20,000
1905	20,000
1906	20,000
1907	25,000
1908	25,000
1909	31,000

The attendance has steadily increased every year with one single exception, until the last fiscal year shows an attendance of 149,450, excluding the 22,697 school children who listened to lectures delivered by the institute speakers in the school buildings, and the 23,750 cooperative meetings.

The price of farm lands is now increasing rapidly, and hundreds of people are, greatly to their advantage, annually coming from the high priced lands of the Middle West and buying farms in this state.

Three agricultural schools have been established by law, one at Canton, in connection with St. Lawrence University; one at Alfred, in connection with Alfred University; and one at Morrisville, Madison county. These schools receive annual appropriations from the state and are liberally patronized by the people.

It is not claimed that all of the improvement in agricultural conditions made during the past 25 years is due to instruction given in the Farmers' Institutes, nor, in fact, to the combined efforts of all the educational forces of the state and nation, for the common course of events has had its influence in improving farm conditions in the East. It is not too much, however, to assert that the effort put forth by those who have assisted in the establishment and success of this movement, to reach and help the farmer in his home, has been one of the greatest factors in bringing about the better conditions in country life that are everywhere manifest to-day.

TWO ADDRESSES

AT THE

FARMERS' INSTITUTE SCHOOL

HELD IN COOPERATION WITH

The New York State School of Agriculture at
Alfred University, Alfred, N. Y.

March 1–4, 1909

Social Phases of Agricultural Education

ADDRESS OF WELCOME DELIVERED AT ALFRED INSTITUTE SCHOOL

By DR. BOOTHE C. DAVIS

President of Alfred University

Mr. Chairman: It is a pleasant task assigned me by the State Commissioner of Agriculture and Conductor Van Wagenen to welcome our guests to Alfred. We are exceedingly glad to welcome to Alfred the representatives of the Department of Agriculture who, under the direction of Commissioner Pearson, have given so much careful attention to the arrangement of this program. Alfred also feels deeply indebted to Cornell University, which has generously loaned to us so many of its professors for this week. It is a pleasure also to welcome a representative of the New York State School of Agriculture at St. Lawrence University. The conductor of this institute school and his corps of instructors are men and women with training and experience, than whom no better can be found anywhere in the country.

The local committee on arrangements has been made up of representatives of the New York State School of Agriculture at Alfred University, representatives of the local grange, and three members appointed one year ago at the Farmers' Institute. This committee has been particularly solicitous to provide every facility for the comfort, convenience and enlightenment of the members of this school. The program has been arranged after much correspondence with the Commissioner of Agriculture, with the desire and purpose of adapting it to the needs of the people of this locality. Provision has been made for lodging and breakfasts for a large number of visitors in the homes of the people of Alfred. The Ladies' Aid Society of the church has generously provided for dinners and suppers to be served in the parish house, at the nominal price of twenty-five cents each. The committee has provided for the use of Firemen's Hall, the parish house, the academy hall and the college chapel, also such other rooms as may be needed for the various exercises of the Institute School.

As has just been remarked by Conductor Van Wagenen in his excellent introductory address, this school inaugurates a new movement not only for western New York, but for the Empire State, and the people of Alfred are congratulating themselves that the movement is introduced here and with such auspicious beginning.

Six years ago Alfred University secured the services of a graduate of the Massachusetts State College of Agriculture, and a course in elementary agriculture was begun in connection with the department of biology. For five years this work was carried on before the State generously came to the support of the movement and established here the New York State School of Agriculture at Alfred University, of which we are all so proud.

This movement in agricultural education is a part of a broader movement of applied science which has been noticeable in the evolution of our own university, from the old line classical course only to modern laboratories of applied science and industrial mechanics with woodshop and machine shop facilities. Added to this we have the New York State School of Clayworking and Ceramics, giving technical instruction of the highest order in all lines of clayware construction.

In his admirable address at the opening of the session this afternoon, Mr. Powell remarked that agriculture is the only undeveloped field of education at the present time. True as this statement is and has been in the past, the gigantic movements on foot to-day bid fair to revolutionize education in agriculture within the next decade.

Even more untouched than the field of agriculture is the great and important field of rural social life. As a student of sociology, I am profoundly interested in the social development of the rural community which is to accompany the widespread application of education to agriculture. Cities have been favored with a careful study of the needs of their population. Trade schools, night schools, mechanics' institutes and social and recreational facilities have been provided for them. Their slum districts have been renovated, their unsanitary conditions improved, and provision has been made for the health, happiness and social upbuilding of the individual.

On the contrary, no scientific study has, until this year, been made of the needs of the people in the country districts. The rural school has been growing smaller and less efficient. The country church has been neglected, its membership falling off and its buildings going into decay. The village, the large town and the city have attracted the thrifty, the progressive and the ambitious, while the country has suffered the loss of this element of its population and has struggled on in its poverty toward despair.

Agricultural education is the movement through which hope must come to this too long neglected portion of our population.

Dean Bailey, of the State College of Agriculture, in his address a few days ago at the Farmers' Week at Cornell, made this significant statement: "At the bottom, all civilization is but a complex of these human questions, economic and social." Agricultural education must be an attempt at the solution of the economic and social questions for the rural population if it shall hope to achieve the results which we expect of it. We have too long overlooked the fact that economic and physical conditions very largely determine not only social institutions, but ideals of patriotism, government, social service, ethics and religion. There are many illustrations which might be cited to prove the tremendous influence which purely physical and economic conditions have on the social life of the people and on their ethical and religious beliefs. I can mention only one.

In the State of Virginia before the outbreak of the Civil War, the eastern portion of the State was given over to the cultivation of the soil; great plantations with large numbers of slaves successfully produced tobacco, cotton and corn. The slave labor seemed necessary and it was profitable. West of the Blue Ridge the mountains and hills prevented plantation industries and compelled other forms of industry, chiefly grazing. There was little use for the slave; and slave labor, at least in large numbers, was unnecessary and unprofitable. As a result, it was an easy and natural thing for the people in the western part of the State to awake to the evils of the slave traffic as a social institution, while the people of the eastern valleys of Virginia were naturally blinded to these evils and held tenaciously to the institution which they had received from their fathers. When the State came to vote upon the great question of secession from the Union it divided into two parts, and the east voted to secede while the west voted to remain in the Union. The great Commonwealth was divided because of different physical characteristics existing between the east and the west and producing different social institutions, different ideals of patriotism, different standards of ethics and religion. More and more in the future we shall be compelled to recognize the fact that these physical and economic conditions of our industrial life in the rural communities must determine our social ideals and also our ethical and religious ideals.

On the program which you hold in your hands, the Commissioner of Agriculture has given us a few brief statistical facts. He has told us that the total farm investments of this State aggregate a little over one billion of dollars; that the total products of the farm investments aggregate less than one-quarter of a billion of dollars annually. If you will figure this out for yourself, you will discover that the products of our farms in the Empire State aggregate a little less than 23 per cent. on the total investment in these farms. It may surprise you to know that this average product of the farms of the Empire State is smaller in percentage than the average production of the farms of the whole United States. In the October number of the *World's Work* a resumé is given of the report of the Secretary of Agriculture for the year 1907. In this report the total capital invested in farms and farm equipment is given at twenty-eight and one-half billions of dollars. The total crops and farm products aggregated in that same year seven and one-half billions, or over 25 per cent. of the total investment; more than 2 per cent. higher than the average production of the farms of New York State. This product of 23 per cent. or even 25 per cent. is far inadequate for the social and economic needs of the people of the rural communities. In the cities, investments in industries which do not produce annually 50 to 75 per cent. gross products from the capital invested are not considered successful enterprises. By way of illustration, let me cite the fact that in the United States one billion of dollars is invested in plants and equipment for the manufacture and sale of strong drink. This billion of dollars of investment produces a gross output which sells for 100 per cent. of the total investment. Thirty-three and one-third per cent. of this gross output is the cost of materials and of labor; 33 1/3 per cent. is the revenue, national, state and local, collected through the excise laws. The other 33 1/3 per cent. is the profit accruing to the manufacturers, the wholesalers and the retailers in the manufacturing and handling of this product — *33 1/3 per cent. of profits,* while the farmer's *gross* output from his investment is less than 25 per cent. and his profit, on the average, sinks into insignificance.

Agricultural education must enable the farmer to produce at a reasonably fair profit, and this profit must provide him with the conditions for a happy social life. It must provide opportunities for education, culture, travel and comfort. Economics divides industries into two classes, first those industries which satisfy our existence wants — which provide us food and clothing and shelter; second, those industries which supply our culture wants — which give us the refinements and delicacies of life and its esthetic uplifts. As the earnings of the individual increase from the low scale which barely supplies his existence wants, the amount which he can expend in the satisfaction of his culture wants increases in geometric ratio. The man who supports his family upon one dollar a day can provide for them little else than the simplest food, the plainest clothing and the humblest shelter. As his earning power increases, a larger proportion of his earnings can be expended in the refinements of life and in those things which give social privilege and esthetic comfort. Thus it is that social life may be elevated above the mere satisfaction of animal wants.

Agricultural education must, for the sake of these social needs of the rural people, provide facilities for their increase of income through the industries to which they give their time and their labor. A continually increasing proportion of our people have been going to the city for their residence. Fifty years ago 90 per cent. of the people were rural people. To-day, nearly 50 per cent. of the population of the country live in urban districts. The invention of steam and electric power and the application of these powers to the manufacture and production of wealth and to its distribution compel the accumulation of large capitalistic enterprises in the city and the gathering together of large numbers of people about these enterprises. But the same inventive genius should enable the farmer to produce more easily and more inexpensively a larger and larger percentage of product from the investment in his lands and in his farm equipment, and as this is done, it will be possible to give an ever increasing uplift to the rural community.

Western New York has been recognizing this need. No part of the State of New York is, perhaps, in greater need of a revival of interest in the rural community, and the coming to Alfred of the State School of Agriculture emphasizes the opportunity that is now upon us. It is for this reason and for the larger interests of our rural life, Mr. Conductor, that we welcome you here in the beginning of this Farmers' Institute School — the first for our county and for western New York. Alfred opens to you, sir, and to your colleagues on the staff of instruction, and to the people who have gathered here from this county and from neighboring counties to enjoy this Institute School, her hospitable homes and her warm hearts. We bid you welcome and will seek to gain from you every possible uplift in instruction and inspiration for a better service in this community in which we live and which we hold so dear.

Land Values and Land Prices in the East and in the West

ADDRESS DELIVERED AT ALFRED INSTITUTE SCHOOL

By G. F. WARREN
Professor of Farm Management and Farm Crops, New York State College of Agriculture at Cornell University

In the agricultural survey work that we have been conducting in Tompkins and Livingston counties, we have found that one of the most important factors affecting the farmer's profits is the amount of capital available for his use. One might say that able men have larger capitals and make more money because they have more ability. But from our statistical study it is evident that the capital itself is of extreme importance in determining the profits that the farmer is able to make. As nearly as we who have visited these thousand farms can judge of individual characteristics, there are plenty of good men failing to make farming pay simply because they do not have enough money available to properly manage the business.

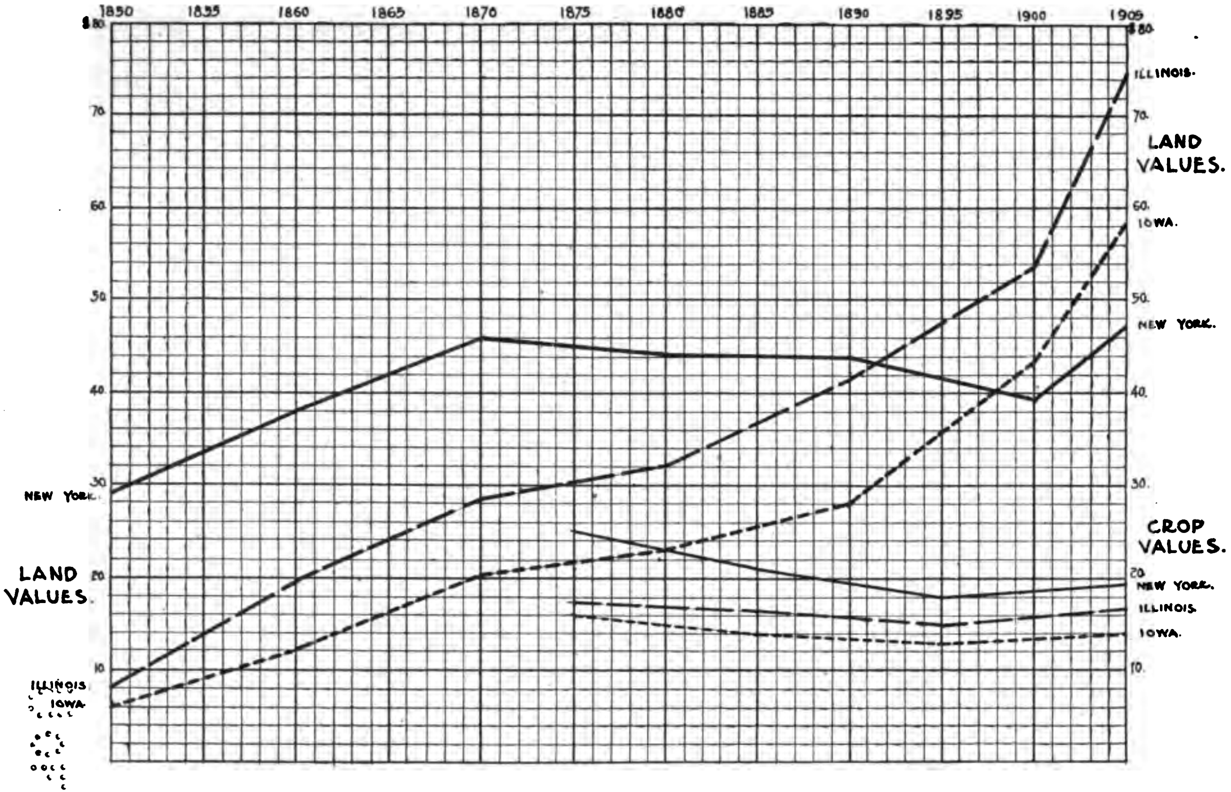
The reasons for this shortage of capital are several, but all rest primarily on the need for confidence in the land. Money lenders have found it so easy to invest money in stocks and bonds and in city mortgages, that they have not been attracted by the opportunities for making loans on farms, nor have they learned how to make these loans satisfactorily. Our great life insurance companies have experts in some of the western states, whose business it is to examine farms and determine how much money may be safely loaned. These men do not sit in an office in a city and make the loan over a desk; they visit the farms and inspect them carefully. Each farm can, therefore, receive a loan according to its merits. Loans in the New York counties so far studied have not been so carefully placed. There seems to be a tendency to loan according to the size of the farm and the section of the county in which it is located, almost regardless of the value of the particular farm. This makes it difficult for the man with a good farm and good buildings to secure what is really a safe loan.

Many farmers whose farms are not mortgaged and who could readily secure a sufficient loan to properly conduct their business, fail to borrow money for the reason that they do not have confidence in the land, and hence go on farming ineffectively. There are a few farmers who have more than enough money to own their own farms clear, and who are making investments in stocks and bonds. In many cases these men might better buy more land and better equipment. The reason that they do not do it is that they do not have faith in the land. The same reason sends many farmers' boys to the cities. In many cases the farm buildings need to be improved, or the land needs drainage or other improvements. Frequently when the farmer actually has the money for such improvements, he fails to make them because he feels that farm property is not a good investment.

REASONS FOR PRESENT CONDITIONS

These conditions are the result of experience. Practically all of the men who are now farming were born at a time when New York land was worth more than it was in 1900. They grew up in a generation of depreciating land values; their whole point of view from childhood has been that farm land was decreasing in value and, therefore, it was not a good investment. The great agricultural depression which lasted until the latter part of the nineties added emphasis to this condition. Bankers who loaned money on farms found that the farms depreciated in value so that the risk was increased. If a man invested $5,000 in New York land in 1890, he would, under the average condition, have had $4,448 worth of land in 1900; the depreciation of land values in the ten-year period being $552 on every $5,000, or 11 per cent. It took good farming in this period of depreciation for a man to make a living and enough more to maintain the value of his investment. Naturally, under these conditions, men came to feel a distrust in land and all that goes with it. Conditions are now entirely different, but the farmer who remembers the years from 1870 to 1900 hesitates to believe that there has been a fundamental change. He questions whether the new conditions are permanent.

Fig. 6.



LAND VALUES & CROP VALUES PER ACRE, NEW YORK, ILLINOIS & IOWA.

REASONS FOR THE DECREASE IN LAND VALUES

The development of the western free land is commonly considered to be the only reason for the decrease in the value of eastern land; but many other causes contributed their share to the depreciation.

Our land was too high in the war time and farms were divided into too small areas, so that after the war was over and when the central west was being settled, it was hard for a man on an average size farm in New York to produce enough to make farming pay; whereas, if he had had twice the area, he might have competed with western farmers. Our farms are now getting larger, as evidenced by vacant houses on land that is not idle. Many persons believe in the little farm, but our statistics show that general farms and dairy farms of from 100 to 200 acres are paying much better than smaller farms.

Another important reason is that we have lived so near cities that the farm boys have been drawn away. In the west where cities and manufacturing enterprises are not so common, farm boys do not see the glamour of the factory and are, therefore, not so likely to be led to leave the farms. All these and other factors contributed to the general depression in farming and to the lack of confidence that necessarily followed.

CHANGES DURING THE PAST TEN YEARS

But conditions have changed. As late as 1860 land in Illinois was used for free range. This land is now selling for from $100 to $250 per acre. Land in Iowa that was free range in 1870 is now selling for from $75 to $200 per acre. In Nebraska there was free range in 1880 on land that is now worth $100 per acre. As late as 1895 there was free range on arid land in western Kansas and Nebraska, on land that is now selling for from $15 to $20 per acre.

Free land in the United States is a thing of the past, though of so recent a past that many eastern farmers do not believe it. There is still some desert land that is free, also some free land that can be irrigated, but irrigated land is expensive when the cost of the water right is considered. There is no more such land as that in

Kansas and Nebraska that was open to settlement twenty years ago. We need have no fear of the irrigated land; only a very small fraction of the arid land can ever be irrigated, and these areas will be reclaimed so gradually as to have little effect.

If our land could come so near to maintaining its value in competition with productive free land, should it not rapidly increase in value when such competition is over?

ARE OUR CROP YIELDS DECREASING?

But some persons say that our land is worn out and our crop yields decreasing. By referring to Table A we will see the facts. The average yields of corn, oats and hay are practically the same as they were forty years ago. The yields of potatoes have decreased and the yield of wheat increased. We may say, therefore, that our crop yields average as high as formerly. We will also see that the yields for the last ten-year period are much better than the preceding ten years.

TABLE A.

[a]AVERAGE YIELDS PER ACRE OF CROPS IN NEW YORK BY TEN-YEAR PERIODS.

	1896–1905	1886–1895	1876–1885	1866–1875
Corn, bushels	30.3	31.1	30.4	31.6
Wheat, "	17.5	15.4	15.5	14.1
Oats, "	31.4	26.2	30.5	32.2
Potatoes, "	79.0	76.0	101.0	101.0
Hay, tons	1.20	1.12	1.16	1.21

[a] All statistics as to crop yields and values per acre are taken from the Yearbook of the United States Department of Agriculture for 1908.

COMPARISON OF CROP YIELDS IN NEW YORK AND ILLINOIS

The opinion is all but universal that we cannot grow as good crops as are grown in the west. For this comparison we have selected not the poorest nor even the average western state, but the one usually considered best — Illinois. In order to eliminate seasonal variations ten-year averages for the last forty years are taken. Each figure is, therefore, the average of the crop for ten years.

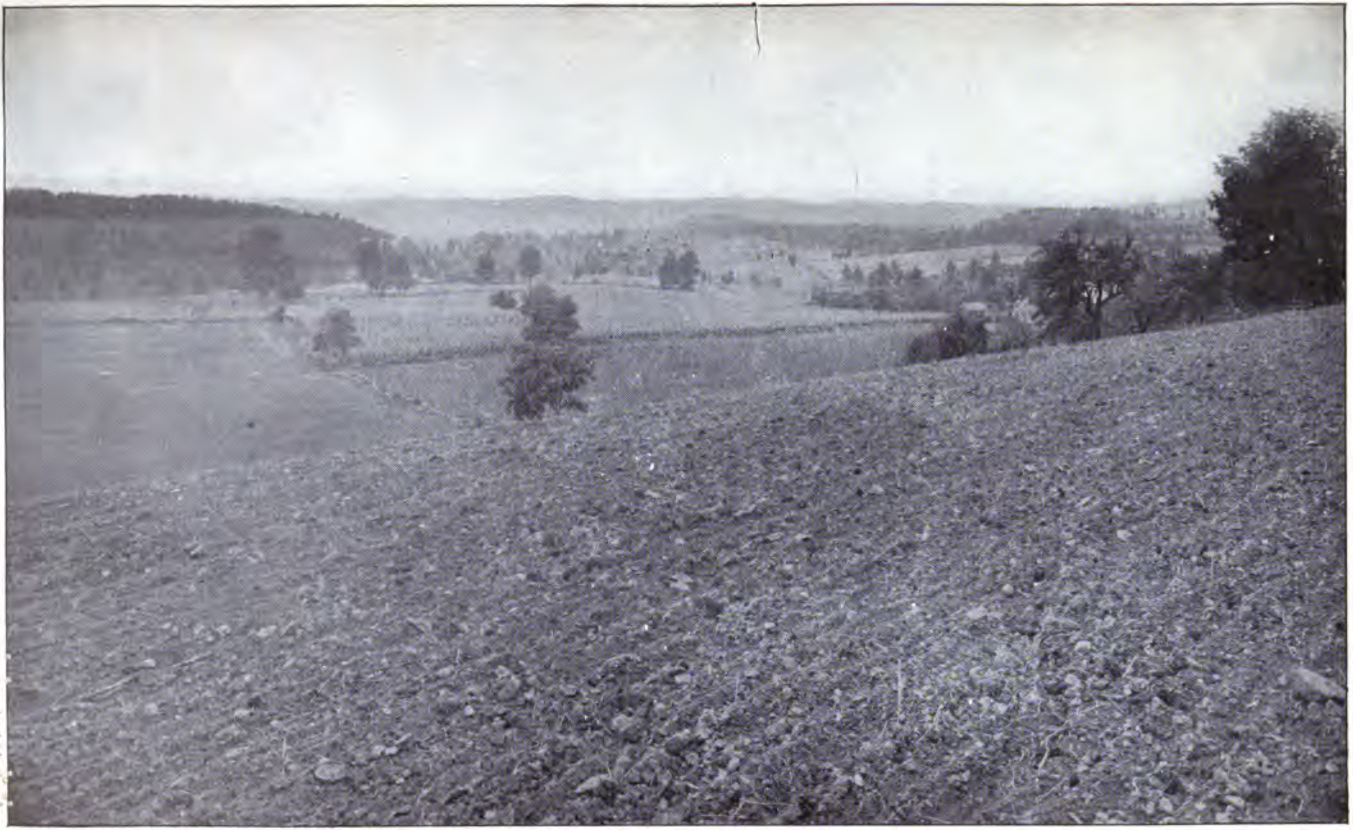


FIG. 7.— GREENE COUNTY.
Farm 800 acres, $15 per acre. Three sets of buildings complete. Good land, good orchards, etc.

MnU

TABLE B.

TEN-YEAR AVERAGE YIELDS.

		1896–1905	1886–1895	1876–1885	1866–1875
Corn	New York	30.3	31.1	30.4	31.6
	Illinois	34.5	29.0	27.2	29.9
Wheat	New York	17.5	15.4	15.5	14.1
	Illinois	13.0	14.3	13.1	11.9
Oats	New York	31.4	26.2	30.5	32.2
	Illinois	32.5	30.4	33.2	30.5
Potatoes	New York	79.0	76.0	101.0	101.0
	Illinois	80.0	63.0	79.0	76.0
Hay	New York	1.20	1.12	1.16	1.21
	Illinois	1.36	1.17	1.38	1.36

From this table it will be seen that the crop yields per acre are nearly as good in New York as they are in Illinois.

AVERAGE VALUE PER ACRE OF CROPS

But New York is so favorably situated with respect to markets that the values per acre of our crops are much above those in Illinois. The difference is still greater when compared with Iowa.

During the last ten-year period the average values per acre of these five staple crops have been $19.42 in New York, $16.70 in Illinois and $13.96 in Iowa — a very decided difference in favor of New York.

TABLE C.

TEN-YEAR AVERAGE VALUES PER ACRE.

		1896-1905	1886-1895	1876-1885	1866-1875
Corn	New York	$16.36	$17.73	$19.15	$24.33
	Illinois	11.38	9.57	9.52	10.17
	Iowa	9.40	9.03	8.59	10.29
Wheat	New York	14.70	13.24	17.67	20.02
	Illinois	9.62	9.87	11.92	11.66
	Iowa	9.02	8.26	7.85	9.32
Oats	New York	10.99	9.43	11.90	14.81
	Illinois	8.45	8.21	8.96	8.54
	Iowa	7.13	7.54	7.59	8.95
Potatoes	New York	42.66	37.24	42.66	50.50
	Illinois	43.20	36.54	41.08	45.60
	Iowa	35.64	33.12	38.72	43.20

TABLE C — (*Continued*).

		1896–1905	1886–1895	1876–1885	1866–1875
Hay	New York	$12.41	$11.89	$13.36	$15.32
	Illinois	10.87	9.49	10.45	11.12
	Iowa	8.61	7.02	6.73	8.23
Average 5 crops	New York	19.42	17.91	20.95	25.20
	Illinois	16.70	14.74	16.39	17.42
	Iowa	13.96	12.99	13.90	16.00

LAND VALUES

Table D and Fig. 6 show the changes in land values. It will be seen that the value per acre of farm land in New York decreased from 1860 to 1900, with the most rapid decline during the years 1890 to 1900. During the last five years there has been a considerable increase in land values, but the increase in Illinois and Iowa is out of all proportion to the increase here.

Fig. 6 shows the shift in land values compared with the average value per acre of the five crops given in Table C. It will be seen that the lines representing values per acre of the different crops are nearly parallel, with New York always in the lead. One would naturally expect that the values per acre of farm land would also be nearly parallel. This is the case for Illinois and Iowa, but there is an emphatic discrepancy in the case of New York. Why this discrepancy? We must come to one of two conclusions. Either New York land is too cheap or Illinois and Iowa land is too high. Perhaps both are true.

There are many causes that have contributed to the anomalous condition of cheap land in the east. Chief among the causes is the tradition that the west is the land of cheap land. The western farmer who is emigrating to Canada does not know of the opportunities here. He believes that all of the east is a region of stony, high-priced land. If the facts were known there is no question but that much of the surplus farming population of the mid-west could be directed eastward.

TABLE D.

AVERAGE PRICES PER ACRE OF FARM LANDS.

	*a*1905	1900	1890	1880	1870	1860	1850
New York	$47.17	$39.21	$44.08	$44.41	$45.89	$38.30	$29.00
Illinois	74.32	53.84	41.41	31.87	28.45	19.56	7.99
Iowa	57.97	43.31	28.13	22.92	20.21	11.91	6.09

a Values for 1905 from Bureau of Statistics Bulletin 43; other values from census reports.

The eastern farmer has seen a change in the past few years, but he grew up in a generation of depreciation and is not going to become an optimist in a few years. This lack of confidence in the land is now the chief reason for our low land values.

Another reason for the condition is the glare of the cities that are supposed to offer untold opportunities to every farm boy. Too often the fireside talk of his parents has been to the effect that in the west the government would give a boy a fortune in the shape of a farm, or that in the cities he would become rich without hard work. We must restore confidence in New York land, and present conditions indicate that this confidence will not be misplaced.

It is true that our land is usually a little harder to till, but this is by no means a universal condition. We have many thousand square miles of land in parts of the State that are level, free from stones and easily worked. As to buildings and improvements, our farms average far ahead of those of the west.

PASTURE LAND

The great natural crops of New York are trees and grass. One-third of our improved farm land is in hay and one-third in pasture. These natural crops together with our large city population will, in the long run, determine our agricultural products. We will ultimately sell large quantities of hay, milk, potatoes, apples, butter, wool, meat, lumber and horses.

The first demand is, of course, for milk and hay for our cities, since these products cannot be shipped long distances, but these demands require only a part of the State. The trouble during the past generation has been that land that should have been producing sheep, horses and lumber was driven out of these industries by competition with free land, and therefore produced hay and milk with the consequent over production and low profits. The recent rise in the price of western land seems to indicate that the time is near at hand when the production of sheep, horses, butter and lumber will occupy a much larger place as profitable industries in New York.

In order to compare the cost of pasturing in different sections of the United States, we sent letters to the experiment stations in each State. These letters were addressed to the men in charge of farm crops and animal husbandry work. Reports were asked for concerning the average value of pasture land, the number of acres required per cow or equivalent, the months used and the number of months of full feed that the pasture furnished. If full feed is furnished for four months and a half feed for two months, the pasture furnishes the equivalent of five months of full feed.

As a basis for comparison we have calculated the amount of money that must be invested in land in order to furnish full feed for one cow one month. Pasture land ought to pay at least five per cent., if it is to pay interest and the cost of even the minimum attention. On this basis we can readily calculate the cost of a month's pasture in each of the states. A summary of these results is given in Table E. The detailed reports are given in Table F. It will be seen that only one man reported free range.

TABLE E.

AVERAGE COST OF PASTURE LAND REQUIRED TO FEED ONE COW ONE MONTH.

	Number estimates.	Cost of land per month of pasture.	Cost of pasture per month.
North Atlantic States	11	$18.00	$ .90
Corn Belt	11	27.00	1.35
Middle West outside of best Corn Belt	17	21.00	1.05
Blue Grass Region	4	31.00	1.55
Southern States	19	6.00	.30
Arid Regions	12	10.00	.50
Western irrigated or moist land	14	13.00	.65

There are many farms for sale in New York at $15 per acre. In regions where this land is situated the usual charge for pasturing animals is fifty cents per month. It will be seen that this is about the cheapest pasture land in the United States except that in the south, but the dangers from Texas fever are a serious handicap in that section. The race question also makes it unattractive to northern farmers.

The days of free range have practically passed and with their passage we may expect to see the development of the great natural grass lands of New York.

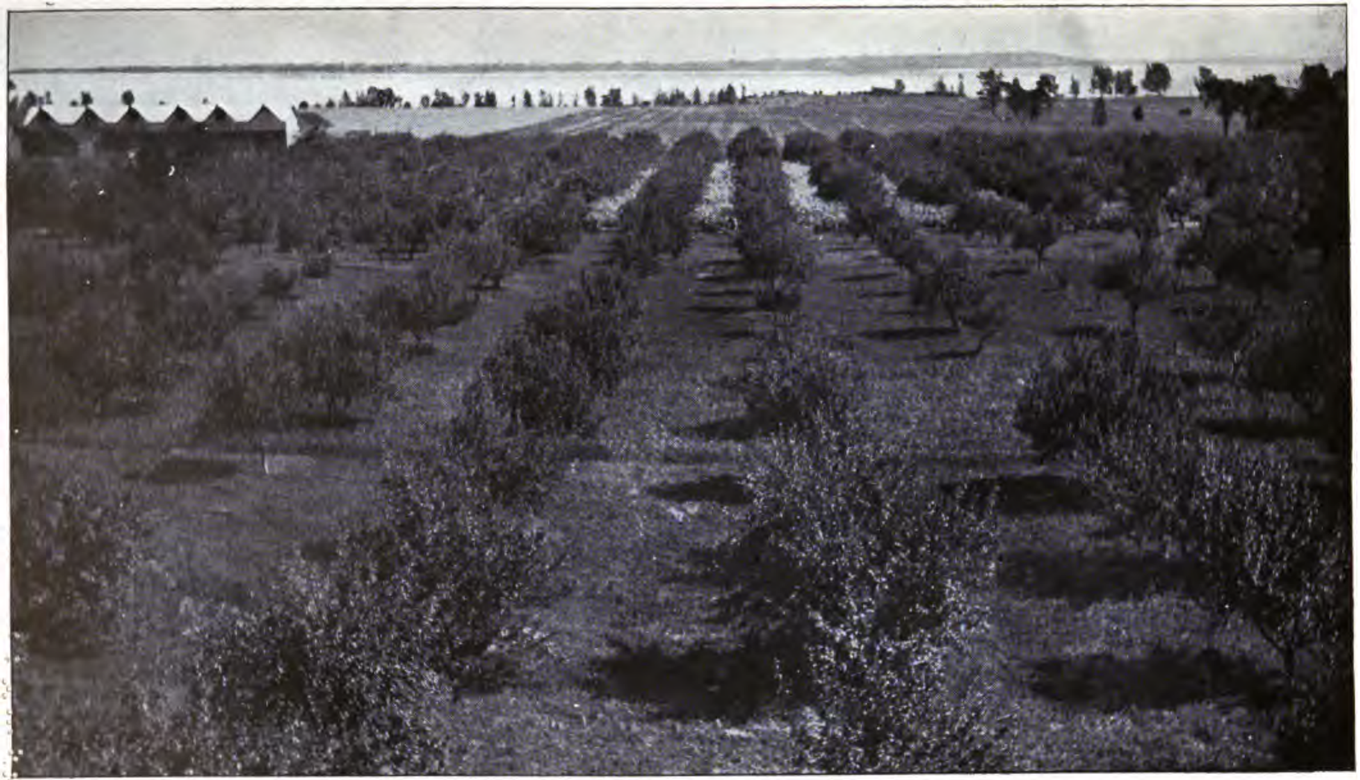


FIG. 8.—CLINTON COUNTY ON LAKE CHAMPLAIN.
Orchard on Farm of 340 acres, $75 per acre.

PRICES OF NEW YORK FARMS

There are any number of farms in southern New York that can be purchased at $15 per acre. Many of these farms have good buildings, that should be insured for the price of the farm. The land is best adapted to apples, potatoes, buckwheat, oats and grass. Some of it is quite level and adapted to the use of large machinery, other farms are more rolling. Some of the farmers in these regions are not very prosperous, but others are doing well, and it seems that the time has now arrived when this land is needed and can be profitably farmed. The types of farming that give promise of best returns are the production of potatoes combined with sheep production. Apples may replace the potatoes or be combined with them. When favorably situated for dairying, cows replace the sheep. In any case colts should be raised and often lumber will add considerable to the income. At the present prices this land pays a good profit if kept in trees.

Good, level, fertile land in the better sections of the State may be purchased at from $40 to $50 per acre. This land is well improved and in good condition. The farms on it are usually prosperous. At these prices land may be secured that is adapted to any of the New York crops.

Some of the best fruit land in the State can be purchased at from $70 to $100 per acre. In regions where the fruit interests have been developed the land is rapidly rising in price, but other land just as good, except that the neighborhood has not yet taken up fruit growing, can be had at $50.

COST OF PASTURE LAND

From several stations two men reported so that we have a check on their accuracy. For instance, for central Illinois one man reported land worth $200 per acre that would pasture one cow six months for each one and five-tenths acres. The other reported land worth $150 per acre with two acres required per cow. In each case it would cost $50 to buy land enough to pasture one cow one month. The results, therefore, check exactly although one man had better land in mind.

TABLE F.

COST OF PASTURE LAND.

STATE	Section	Months		Acres per cow	Value per acre	Cost of land per month of pasture
		Used	Full feed			
North Atlantic States						
Maine	Waste	......	4.0	17.5	$6 00	$26 00
"	Tillable	4.0	3.0	5.0	15 00	25 00
New Hampshire		5.0	4.0	3.0	18 00	14 00
"		6.0	4.5	4.0	13 00	12 00
Massachusetts	Eastern	6.0	4.5	8.0	6 00	11 00
"	Western	5.5	4.5	8.0	5 00	9 00
Connecticut	Better land	5.0	4.0	1.0	50 00	13 00
"	Poorer land	5.0	3.0	2.0	20 00	13 00
Rhode Island		6.0	4.5	3.5	27 00	21 00
New Jersey		6.0	4.5	2.5	50 00	28 00
Pennsylvania	Southwest	6.0	4.5	2.5	50 00	28 00
		5.5	4.1	......	....	$18 00
Corn Belt						
Illinois	Central	6–7	6.0	2.0	$150 00	$50 00
"	"	6.0	6.0	1.5	200 00	50 00
"	Southern	7–8	7.0	5.0	40 00	29 00
Iowa	Central	6.0	5.5	1.5	100 00	27 00
"	Northern two-thirds	5.5	5.5	1.5	75 00	21 00
"	Southern one-third	6.0	6.0	2.0	60 00	20 00
Kansas	Eastern	7–8	7.0	2.0	55 00	16 00
Nebraska	"	7–8	6.0	2.0	55 00	18 00
"	"	......	6.0	2.0	60 00	20 00
Missouri	Corn Belt	7.0	6.0	2.0	75 00	25 00
"	Northern	6.0	5.0	3.0	43 00	26 00
		6.6	6.0	......	....	$27 00
Middle West outside Main Corn Belt						
Michigan	Best land	......	5.0	1.0	$100 00	$20 00
Ohio	Southeastern	6.0	4.0	2.0	50 00	25 00
Wisconsin	Northern	5.5	4.5	2.5	25 00	14 00
"	Middle	6.0	5.0	1.75	75 00	26 00
Minnesota	Northern one-third	4.5	3.5	2+	28 00	16 00
"	Northwestern	5.0	4.5	2.0	33 00	15 00
"	Southern two-thirds	6.0	4.5	2.0	43 00	19 00
"	Southwestern	5.5	5.0	1½	55 00	15 00
"	Southeast in rotation	6.0	5.5	1½	70 00	16 00
North Dakota	Eastern	5.0	4.0	3.0	30 00	15 00
"	Red River Valley	5.5	4.5	2.0	50 00	22 00
Kansas	Central	......	5.0	2.5	20 00	10 00
"	"	......	4.0	3.5	20 00	18 00
Kentucky	Western	7.0	5.0	4.5	35 00	32 00
"	"	6.0	4.0	3.5	50 00	44 00
Missouri	Poorer sections	6–7	6.0	3.5	33 00	19 00
"	Southern	8.0	7.0	11.5	17 00	28 00
		5.9	4.8	......	....	$21 00
Blue Grass Region						
Kentucky	Blue grass	8–9	6–7	2.8	$100 00	$43 00
"	"	8.0	6.0	2.5	100 00	42 00
Tennessee	"	10.0	8.0	3.0	50 00	19 00
Virginia	"	8.0	7.0	3.0	50 00	21 00
		8.6	6.9	......	....	$31 00
Southern States						
Tennessee	Western	8–9	7.0	2.0	$25 00	$7 00
North Carolina	Mountains	7.0	7.0	2.0	20 00	6 00
"	Coastal Plain	5.0	4.0	7.0	5 00	9 00
"	Piedmont	6.0	5.0	2½	18 00	10 00
South Carolina	"	8.0	5.0	2.0	35 00	14 00
Georgia	Northern	8–9	6–7	2.0	18 00	6 00
"	"	7.0	6.0	4.0	7 00	5 00
"	Southern	10.0	9.0	3.5	8 00	3 00

TABLE F — (*Continued*).

STATE	Section	MONTHS		Acres per cow	Value per acre	Cost of land per month of pasture
		Used	Full feed			
Southern States — (Continued)						
Georgia..........	Southern................	7.5	6.5	4.0	$7 00	$4.00
Florida..........	"	10–11	10.5	2.0	8 00	2 00
"	Northern................	9.0	9.0	10.0	4 00	4 00
Arkansas.........	South Ozarks (bottoms)....	12.0	9.0	1.5	20 00	3.00
"	Ozarks (good land)........	10.0	7.0	1.0	40 00	6 00
Mississippi........	Northeastern.............	8.0	8.0	4.0	13 00	7 00
"	Central and southern.......	8.0	8.0	6.0	9 00	7 00
Alabama..........	Western and northern......	8–10	8–10	2.0	12 00	3 00
"	Eastern..................	7.0	7.0	4.0	10 00	6 00
Louisiana........	Northern................	8.0	6.5	2.5	13 00	5 00
"	Southern................	9.0	8.0	1.0	30 00	4 00
		8.3	7.2	......	....	$6 00
Arid Regions						
North Dakota....	Western.................	8.0	6.5	10.0	$10 00	$15 00
Nebraska.........	"	9.0	6.0	10.0	8 00	13 00
"	"	7.0	6.5	25.0	5 00	19 00
Kansas...........	"	9–12	9.0	9.0	13 00	13 00
Texas............	Southwestern............	......	12.0	10.0	7 00	6 00
"	Northwestern............	......	12.0	8.0	10 00	7 00
Montana..........	Open range..............	6–7	5.0	15.0	5 00	15 00
New Mexico......	6,500 feet........	6.0	6.0	17.5	88	3 00
"	Below 6,500 feet..........	12.0	12.0	30.0	88	2 00
Arizona..........	Free range..............	12.0	12.0	Many acres	00	00
Oregon...........	Eastern.................	8–12	8.0	7.0	15 00	13 00
California........	....	......	10.0	10.0	10 00	10 00
		9.0	9.0	......	....	$10 00
Western Moist and Irrigated Land						
Montana.........	Irrigated................	6.0	4.5	½	$75 00	$8 00
Idaho............	Northern................	6.0	5.0	[illegible]	58 00	6 00
"	Irrigated................	7.0	6.0	[illegible]	113 00	6 00
"	"	5.0	5.0	2.0	50 00	20 00
Utah............	Utah and South Idaho.....	7.0	5.5	1.5	50 00	14 00
"	Lowland.................	7.0	6.0	1.0	20 00	3 00
"	Irrigated................	6.0	5.0	1.0	88 00	18 00
Arizona..........	Alfalfa (irrigated).........	12.0	12.0	.88	188 00	14 00
Nevada..........	River bottoms............	......	12.0	4.0	55 00	18 00
"	Irrigated grass...........	......	6.0	[illegible]	100 00	11 00
"	" alfalfa[a]...........	......	6.0	[illegible]	150 00	13 00
Washington......	Near cities..............	7.0	7.0	[illegible]	250 00	24 00
"	Alfalfa..................	7.0	7.0	5/12	150 00	9 00
Oregon...........	Coast...................	10.0	9.0	2.0	88 00	20 00
		7.3	6.9	......	....	$13 00

[a] Not much used on account of bloat.

STATISTICS OF NEW YORK PRODUCTS

One of the greatest needs in New York agriculture is a realization of the changed conditions and of the opportunities offered by the State. Statistics of production will help to establish this confidence in the land. No other state is in the lead in such a variety of products.

The following statistics are taken from the latest sources — from the Yearbook of the United States Department of Agriculture for

1908 and from the census reports for 1899 for products not given in the Yearbook.

TABLE G.

PRODUCTS IN WHICH NEW YORK IS ONE OF THE FIVE LEADING STATES.

Total Value of Farm Products (*Census*).

United States	$4,739,119,000
Iowa	365,412,000
Illinois	345,650,000
Ohio	257,066,000
New York	**245,271,000**
Texas	239,823,000

Over one-twentieth of the total value of farm products in the United States is produced by New York.

Value of Dairy Products (*Census*).

United States	$472,369,000
New York	**55,474,000**
Pennsylvania	35,860,000
Illinois	29,639,000
Iowa	27,517,000
Wisconsin	26,780,000

Over one-ninth of the total value of all dairy products in the United States is produced by New York.

Potatoes (1908).

United States	$197,039,000
New York	**26,138,000**
Pennsylvania	15,955,000
Maine	15,921,000
Michigan	13,572,000
Wisconsin	12,096,000

Over one-eighth of the total value of potatoes produced in the United States comes from New York.

Orchard Products (*Census*).

United States	$83,752,000
California	14,527,000
New York	**10,542,000**
Pennsylvania	7,976,000
Ohio	6,141,000
Michigan	3,676,000

Over one-eighth of the value of all orchard products in the United States is grown by New York.

Hay (1908).

United States	$635,423,000
New York	**70,033,000**
Pennsylvania	56,124,000
Ohio	39,933,000
Illinois	38,893,000
Iowa	36,822,000

Nearly one-ninth of the total value of the hay crop of the United States is produced by New York.

Milk Sold (*Census*).

United States	$184,842,000
New York	**36,249,000**
Pennsylvania	17,274,000
Wisconsin	15,717,000
Illinois	14,478,000
Iowa	12,276,000

Nearly one-fifth of the value of all the milk sold in the United States is produced by New York.

Oats (1908).

United States	$381,171,000
Iowa	46,386,000
Illinois	44,321,000
Wisconsin	34,350,000
Minnesota	25,372,000
Nebraska	22,992,000
New York	**21,070,000**

New York ranks sixth and produces nearly one-eighteenth of the value of oats grown in the United States.

Vegetables (*Census*).

United States	$143,782,000
New York	10,737,000
Texas	6,952,000
Michigan	4,339,000
Virginia	6,589,000
Pennsylvania	6,436,000

Nearly one-thirteenth of the total value of all vegetables exclusive of potatoes is grown in New York.

Eggs (*Census*).

United States	$144,286,000
Ohio	10,281,000
Iowa	10,017,000
Pennsylvania	9,081,000
Illinois	8,942,000
New York	**8,630,000**

Over one-seventeenth of the total value of eggs in the United States is produced by New York.

Buckwheat (1908).

United States	$12,004,000
New York	**5,189,000**
Pennsylvania	3,744,000
Michigan	527,000
Maine	518,000
West Virginia	306,000

Nearly one-half of the total value comes from New York.

Grapes, Wine, Raisins, etc. (*Census*).

United States	$14,091,000
California	5,623,000
New York	**2,764,000**
Ohio	993,000
Pennsylvania	640,000
Michigan	503,000

Nearly one-fifth of the total value comes from New York.

Field Beans (*Census*).

United States	$7,634,000
New York	**2,473,000**
Michigan	2,361,000
California	1,023,000
Maine	291,000
Wisconsin	206,000

Nearly one-third of the total value comes from New York.

Nursery Products (*Census*).

United States	$10,124,000
New York	**1,642,000**
Iowa	619,000
Illinois	578,000
California	558,000
Pennsylvania	541,000

Nearly one-sixth of the total value comes from New York.

Farm Forest Products (*Census*).

United States	$109,990,000
New York	**7,671,000**
Michigan	7,530,000
Pennsylvania	6,481,000
Wisconsin	6,116,000
Ohio	5,626,000

Nearly one-fourteenth of the total value comes from New York.

Flowers and Plants Sold (*Census*).

United States	$18,759,000
New York	**2,868,000**
Pennsylvania	2,246,000
New Jersey	1,953,000
Illinois	1,895,000
Massachusetts	1,640,000

Over one-seventh of the total value comes from New York.

Small Fruit (*Census*).

United States	$25,031,000
New York	**2,538,000**
Ohio	1,767,000
Michigan	1,680,000
Massachusetts	1,494,000
New Jersey	1,406,000

Over one-tenth of the total value comes from New York.

Rye (1908).

United States	$23,455,000
Pennsylvania	4,358,000
Michigan	4,050,000
Wisconsin	3,710,000
New York	**1,938,000**
Minnesota	1,026,000

Nearly one-twelfth of the total value comes from New York.

Hops (*Census*).

United States	$4,082,000
New York	**1,600,000**
Oregon	938,000
California	925,000
Washington	590,000
Wisconsin	18,000

Over one-third of the total value comes from New York.

Onions (Census).

United States	$6,638,000	Massachusetts	$332,000
New York	1,066,000	California	297,000
Ohio	826,000		
Michigan	345,000		

Nearly one-sixth of the total value comes from New York.

TABLE H.

In values of farm products New York State ranks among the states:

First — Hay, all dairy products, milk, potatoes, buckwheat, beans, farm forest products, vegetables, apples, small fruits, flowers and plants, nursery products, hops, onions.

Second — Honey and wax, orchard products, grapes.

Fourth — Total value of all farm products, rye.

Fifth — Eggs, sugar-beets.

Sixth — Oats.

Seventh — Poultry and eggs.

Eighth — Animals slaughtered.

Ninth — Barley.

Thirteenth — Wool.

Fourteenth — Animals sold.

Twenty-second — Wheat.

Twenty-fifth — Corn.

TABLE I.

NEW YORK PRODUCTS THAT EXCEED ONE MILLION DOLLARS PER YEAR IN VALUE.

	Value of products, census 1899.	Value of products, 1908.
All farm products	$245,271,000	
Hay	55,237,000	$70,033,000
Pastures (over one-third of the improved farm land).		
All dairy products	55,474,000	
Milk sold	36,249,000	
Potatoes	15,019,000	26,138,000
Animals sold and slaughtered	23,346,000	
Oats	12,929,000	21,070,000
Poultry and eggs	14,791,000	
Eggs alone	8,630,000	
Corn	9,182,000	19,400,000
All orchard products	10,542,000	

TABLE I — (*Continued*).

	Value of products, census 1899.	Value of products, 1908.
Vegetables (not potatoes)	$10,737,000	
Farm forest products	7,671,000	
Wheat	7,333,000	$7,674,000
Buckwheat	2,046,000	5,189,000
Flowers and plants	2,868,000	
Grapes and wine	2,764,000	
Small fruits	2,538,000	
Beans	2,473,000	
Rye	1,393,000	1,938,000
Nursery products	1,642,000	
Hops	1,600,000	
Onions	1,066,000	
Barley	1,402,000	1,401,000
Wool	1,388,000	
Tobacco	1,172,000	690,000

ADDRESSES DELIVERED

AT THE

FARMERS' INSTITUTES

January 1, 1908—September 30, 1909.

The Value of Soil Humus

By John G. Curtis, Farmers' Institute Lecturer

Leaving entirely out of consideration the peaty or muck soils, which, because of their peculiar formation, are in a class by themselves, it is my belief that most soils of good depth and drainage are naturally productive or unproductive in almost exact proportion to the amount of humus they contain. Furthermore, a fertile soil cannot become exhausted, but it may become unproductive through the depletion of its humus and the only practical way of improving such soil is through the restoration of its humus content.

It is not so much a question of the kind of humus as it is of the amount of humus, although it is obvious that, other things being equal, the organic matter which contains the largest amount of the necessary plant food elements is of most value. The fact that the leguminous plants contain from two to three times as much nitrogen as does timothy and other like grasses makes their general use for the addition of humus most desirable.

Although the importance of a goodly supply of humus in the soil has long been recognized by farmers generally and certain methods of farming which tend toward the accumulation of humus have been practiced in most sections, it is only within a comparatively short time that some of the reasons that its presence is so very essential to the productiveness of soils have been thoroughly understood.

Before we can have a clear conception of the subject, let us see if we understand fully just what a soil is and just what humus is. Soil is decomposed rock, plus humus. Humus is organic matter in the soil in any stage of decay and, of course, includes the products of that decay. Organic matter is anything that has life or that has had life, either animal or vegetable.

The important thing to remember is that we do not have a soil until we add the organic matter to the decomposed rock, since decomposed rock alone is simply earth, and a clear distinction between earth and soil must necessarily be made in all successful attempts at soil improvement throughout the world. Some one may say, " Well, that's a pretty fine distinction for a farmer to make." And it is, but it is necessary because we cannot grow our domestic crops in earth alone, for the reason that the crust of the earth contains no nitrogen and it is well known that a supply of available nitrogen is absolutely essential for the growth and development of our domestic plants.

In other words, the humus in the soil contains all of the nitrogen of the soil that is available for the growth of plants, except in the case of one family of plants, the legumes, which are known to have the power of obtaining a portion of the nitrogen necessary for their growth from the nitrogen of the air in the soil. But, aside from the very minute quantities of nitrogen that are added to the soil from the atmosphere by means of rain and snow, it is believed that the sole supply of nitrogen in the soil for all plants, except the legumes, is that resulting from the decay of organic matter in the soil. Thus we see that a low percentage of humus means a low percentage of nitrogen and a correspondingly weak plant growth.

A good illustration of this has been given by Professor Harry Snyder, of the University of Minnesota, in the case of the noted Red River Valley wheat section where the growers under their system of cropping the soil with wheat year after year and burning the straw, thereby losing the organic matter and the nitrogen it contained, had in 25 years reduced the humus content of the soil from 5 per cent. to 2½ per cent. and at the same time the productive capacity of the soil had fallen from 30 bushels per acre to 15 bushels per acre.

Before going further, let me caution you that water is not organic matter and that it will not make humus. I had used cover crops for adding humus to the soil for several years before I learned that fact. When I plowed under a crop of crimson clover that stood way above the horses' knees, I knew that the entire weight of the green crop — roots, stems and leaves — was at least 10 tons per acre, and I thought I was adding 10 tons per acre of organic matter to the soil, whereas I was only adding 2 tons per acre, since fully 80 per cent. of each plant was water and water is not organic matter. Also, when you plow under 12 tons of barnyard manure per acre, remember that only 3 tons of it are organic matter and the other 9 tons are water, as stable manure usually averages about 75 per cent. water.

The fact that soils well supplied with humus conserve moisture better, are more easily gotten into the condition of a fine, mellow seed bed, and warm up several days earlier in the spring is so well known that I need only refer to it here. There is, however, another phase of the question too often overlooked and that is the important part which humus plays in converting the dormant phosphorus and potassium in the soil into available forms. The rock part of the soil, which includes the rocks, stones, gravel, sand, silt and clay particles, contains the bulk of the potassium and phosphorus of the soil, but these rock particles have to be dissolved before the phosphorus and potassium which they contain become available as plant food. When organic matter decays in the soil, one of the products of that decay is carbonic acid gas which is absorbed by the soil moisture and gives to it the power to more rapidly dissolve the rock particles of the soil and thereby render their plant food elements available. So we see that not only is the soil humus the sole source of nitrogen for the great bulk of our plants, but that indirectly it is largely responsible for the availability of the natural stores of phosphorus and potassium which occur in all soils.

During the growing season there is a continual decay of the organic matter of the soil into its final products, and, if we would keep up the proper proportion, there must be a constant replenishment from some source. That brings us face to face with this fact, namely: Humus in the soil is of no value as plant food as long as it remains humus, or, in other words, we must destroy the humus, as such, before the plant food elements which it contains can become available.

It has been shown by Professor H. W. Conn, of Wesleyan University, and others that this decay of the organic matter can only take place through the activity of certain bacteria in the soil and that certain conditions are necessary for their activity, among the most important of which is the presence in the soil of a certain amount of air, heat and moisture. So it appears that our problem is largely one of economically adding large quantities of humus to the soil, and then so handling the soil as to cause the humus to decay rapidly enough to liberate a sufficient number of plant food elements at the right time during the growing season for our crops to make a normal or maximum growth.

I have tried to show that humus in the soil is not only valuable but that it is indispensable and the most vital problem for the farmer to solve at this time is: How can I best carry on a system of farming that will be profitable and at the same time allow me to continually augment the supply of humus in my soil?

My suggestion is that you practice a short rotation of crops, plowing under heavy sods frequently, and that you make the best possible use of all the stable manure and litter that the farm affords. Supplement this with cover crops to turn under wherever their use can be made practical, even to the extent of taking the poorest field on your farm, that is the one in which the soil is most deficient in humus, right out of the regular rotation of farm crops for one or two years. On it grow several crops of rye, vetches, Canada peas, buckwheat or some other bulky crop for the sole purpose of plowing them under to add large quantities of organic matter to the soil, to take the place of that which has been used up under a careless system of husbandry. I hope you will become such strong advocates of the use of cover crops that you will determine never to plow another acre of bare soil, but rather to always turn under large amounts of organic matter in some form, for that is the way good soils are made.

Drainage

By T. E. Martin, Farmers' Institute Lecturer

Soils are made up of innumerable, irregular, infinitesimal particles of inorganic and organic matter, varying in size from 4/100 to 2/10000 of an inch in diameter. They touch each other only in part, according to their size, form, shape and to the compactness of the soil. Hence, there is in a soil considerable space which ranges from 37 per cent. in coarse soil to 65 per cent. in fine silt or clay; or about one-half the volume of ordinary soil is space. The coarser the soil particles, the larger the spaces, but there are less of them, and little resistance is offered drainage and drought. With a fine soil, however, the spaces are smaller, but several times more numerous and more retentive of water, consequently offering more resistance to drainage and drought. Therefore, fine, wet soils require systematic drainage. These spaces associate, more or less, thereby establishing communication in every direction throughout the entire soil, forming a complete net-work of hair-like tubes, by which drainage, soil moisture and aeration are effected. These spaces should be full of both moisture and air. Tramping of wet soils forces the soil particles close together, driving the water into adjoining spaces. Consequently, the future drainage, aeration and ventilation of that particular soil is interfered with, as the soil particles can not readily readjust themselves. With a drained soil the spaces, being full of air, act as a cushion or buffer when under compression, showing positively the serious danger that may result from working soil while too wet.

If an outlet, either natural or artificial, is provided, the soil water seeks an equilibrium which corresponds to the water table level. We must ever bear in mind, however, that while rain water is thus passing through a soil, virtually filtering it, it is at the same time accomplishing the two-fold mission of giving up its plant food and acting as a solvent of present plant food. Moreover, as the water passes down, each soil particle retains by surface tension a film of moisture, said to amount in the aggregate to from 15 per cent. to 20 per cent. of all the water a soil will hold. Water not thus retained is classed as free, excess or surplus water which soon becomes stagnant. As such it is dangerous and should be promptly removed. Such soils naturally become cold, backward, inactive, stagnant, sour and irresponsive to fertilization; tillage and seeding are delayed; crops are dwarfed and premature. Also, bacterial and other agencies are virtually suffocated or drowned, while the land is called poor, infertile, unproductive. The air spaces are in a manner the lungs, breathing organs of both soil and plant, and the crop is murdered or choked to death by surplus water.

Many barrels of water may stand on a field without attracting much attention, with hundreds more in the soil and subsoil. If the soil is not relieved of this burden it must be evaporated by the sun's heat. Here is a demonstration of the sun's heat wasted, or diverted from the designed plan of warming the soil. Sun heat is required by the soil as much as coal and fire are required to develop power for an engine. Many say they cannot afford to drain, yet suffer the short crop.

If drainage is provided, the soil spaces automatically free themselves of the surplus water in obedience to the law of gravitation, sending it from one soil space to another along the path of least resistance. A cubic foot of water weighs about 62½ pounds and it is this weight, together with the constant 15 pounds per square inch atmospheric pressure, which removes surplus water and fills the soil spaces with atmosphere. As the water goes out the air goes in. Also the soil is warmed, aerated and ventilated while being dried.

By systematic drainage the water table may be lowered to any desirable depth, ever remembering that this same water table in the subsoil, below the drain grade, is not interfered with. This is the top of an underground lake or reservoir, an almost inexhaustible storehouse supply, from which, through the tiny soil hair tubes, by capillary attraction, the water is brought up sometimes from unbelievable depths to the crop root hairs. It replenishes the film moisture, dissolving and disseminating predigested plant food to every part of the soil, even against gravity, a process precisely the reverse of drainage. At first thought, these principles may appear to be opposing forces. While one obeys the law of gravitation the other responds only to capillarity, assisted by surface tension.

The atmosphere, an aereal sea as large as all the land and water combined, has an interchangeable affinity for the earth's moisture. Therefore, whenever practicable, timely cultivation will provide an earth mulch which prevents the escape of the soil moisture into the air. This soil moisture should be guarded jealously.

Drains have no magical power to extract water from a soil, except by the porosity of the soil and the law of gravitation. Drains provide for the escape of surplus water only. Doubtless *no* water enters a drain until the subsoil below the drain grade is saturated and film moisture established. Therefore, no trouble need be borrowed about the drainage being overdone by a thorough drain system. Drainage prevents heaving out of crops. Drains cannot drain below their grade and seldom lower the water table, especially in tight, fine soils, to drain grade, because of the resistance offered by such a soil.

During and after heavy, continuous rains, even if the whole soil is full of water, thoroughly drained land never becomes stagnant, because there is at all times a constant movement of water and air drainward. Drained soil is dryer in wet weather, yet more moist during a drought than undrained land. During the growing season, the air is usually much warmer than water. According to actual thermometer tests, the upper 7 inches of drained land averages about 15 degrees warmer than undrained soil and at a depth of 2½ feet the drained land is 1.7 degrees warmer. Also, the land is one to two weeks earlier. Work can be done on time. Land drainage is almost equal to moving a farm 100 miles south. Drainage of tight, hard-pan subsoils is often much benefited by aeration. While possibly only 75 per cent. efficiency of a complete drain system is realized the first season after installation, it continues to increase in value for years before perfection is reached.

A dry soil is understood to contain ample moisture while the excess water passes down or out by natural or artificial means. An ideal soil is one that never becomes too wet nor too dry and ever has an abundant supply of available plant food to grow a maximum crop. Surface water should not flow over the surface, because the soil is run together, gullied, and plant food is diluted, washed out and carried away.

Open ditches remove surface water principally, leaving the soil and subsoil saturated; also, they cause cut-into, ill-shaped, triangular fields, which are inconvenient, expensive and a torment to operate.

Tile drainage, of course, is the artificial removal of all the surplus water, both surface and free in the soil and subsoil, leaving the whole ground surface unobstructed for rapid, wholesale, economical, modern agricultural methods and the growing of profitable crops.

Whatever may be said to the contrary, an experienced person or civil engineer should lay out the drain system and determine grades. The one aim should be to adapt the system to the land and not the land to the system. Just use plain horse sense. A drain plan that commences nowhere and ends anywhere should not be tolerated. The cost of drainage can be closely determined before a spade is stuck in the ground.

Round tile is the approved form, for the cylinder is recognized as a shape of strength and service, as well as being self-cleaning. Hard burned, or, still better, the vitrified tile or sewer pipe, should always be demanded. Two-foot lengths of sewer pipes are preferable in soft, springy ditch bottoms. Some say 2-foot pipe lengths will not afford effectual drainage, but such is not true, as the writer has drained acres satisfactorily with 2-foot lengths of sewer pipe. Good seconds in sewer pipe are good enough for farm drainage, if not soft burned and checked up, and often can be purchased at less than the cost price, or cheaper than same size drain tile if bought out of season. Sewer pipe, or tile, 45 degrees Y branches, tees, elbows and bends, are excellent for joining laterals to mains, making curves, turns, etc.

To find the area and carrying capacity of tile, square the diameter and multiply by .7854, as follows:

Square Inches.
2×2 = 4×.7854 = 3.1416
3×3 = 9×.7854 = 7.0686
4×4 = 16×.7854 = 12.5664
5×5 = 25×.7854 = 19.6350
6×6 = 36×.7854 = 28.2744
7×7 = 49×.7854 = 38.4846

Square Inches.
8×8 = 64×.7854 = 50.2656
9×9 = 81×.7854 = 63.6174
10×10 = 100×.7854 = 78.5400
12×12 = 144×.7854 = 113.0976
15×15 = 225×.7854 = 176.7150
18×18 = 324×.7854 = 254.4696

Ordinarily, a 3-inch lateral drain from 40 to 60 rods long should be increased to a 4-inch tile, or one 4-inch tile will carry about as much water as two 3-inch tiles. Table above gives relative area of tile. The ability of a drain to deliver water is regulated by its size and grade. A 6-inch main flowing at the rate of 50 feet per minute will discharge 73.44 gallons, while if the grade were increased to a speed of 100 feet per minute, the amount of water delivered would be double or 146.88 gallons. For general drainage 6 to 8-inch mains are sufficiently large for 50 acres of land. Circumstances alter cases. Better err on the side of too large drains than too small.

The outlet is of primary importance. If not good, extra labor on a neighbor's farm will often correct it. The outlet rod of a drain or drain system should be of vitrified pipe to prevent damage from freezing. Outlet pipe should be a special pipe and provided with ½-inch holes for vertical iron rods, 2 inches apart, to keep out animals having exploring and water-loving propensities. Also, the outlet pipe should be established in a concrete abutment which provides stability to both outlet and bank. One outlet is invariably preferable to several.

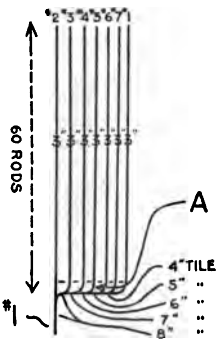
Mains are merely underground passageways for the removal of drainage waters, generally following the low places. Owing to their size they are more expensive. It is, therefore, good business management to have as few of them as possible. Whenever practicable the main should be so placed in relation to the laterals that it will do double duty, performing both main and lateral service. Also, mains should be laid at least one-half of their diameter below the lateral grade, so the laterals may discharge water and sediment freely into the main without the formation of back water in the lateral. Main and outlet should be unobstructed, thus allowing sediment to be washed out from head to foot; otherwise, the sediment will have a tendency to lodge at the dead water line.

A profitable and effectual drain system should reach all wet parts of a field and receive and deliver the excess water promptly at the outlet. If at all consistent with the outlet and grade, the drain system should be at least 3 feet deep. Four feet is undoubtedly 25 per cent. better. An even, uniform grade throughout, or sectionally if the grade necessarily changes, is very desirable, so that sediment may find no low places below grade for lodgement and later cause incalculable trouble. The deeper the drainage, the more room for crop root pasturage. Drainage doubles the depth of a farm. Alfalfa roots go deep. The better and deeper the root system, the more the crop is fortified against drought and disease, moisture and plant food being guaranteed. Long lengths of pipe and cemented joints prevent tree root troubles.

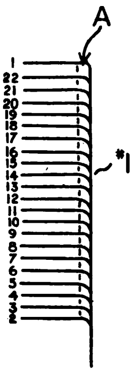
Occasionally a farmer has a mania for more land and sacrifices much to attain it, while right under the present farm is another one. In many instances the basement story can be drained for $10 per acre, which virtually gives the owner a second farm. On this point Emerson says: "This year a very large quantity of land has been discovered and added to the agricultural land and without a murmur of complaint from any neighbor. By drainage we have gone to the subsoil and have a Concord under Concord, a Middlesex under Middlesex and a basement story of Massachusetts more valuable than all the superstructure. Tiles are political economists. They are so many young Americans announcing a better era and a day of fat things." Buildings do not make a farm but a farm may make buildings. Drainage makes both.

Again, some farmers are inclined to nibble, to their sorrow, at flashy inducements, questionable stocks, gold mine investment, wind companies, wild-cat schemes, etc. Money borrowed at 6 per cent. and intelligently invested in tile drainage is sure to give annual premiums, eclipsing many of the popular investments of the day. A wet soil, well drained, is a veritable gold mine. It has, in latent form, all its original resources. Without fear of contradiction, it is safe to say that simple drainage work is more generally needed throughout America than any other one agricultural improvement.

Drains should run straight up and down the slope, because if so disposed they take water equally from either side. Thus the owner enjoys 100 per cent. efficiency on money and labor invested, instead of only 50 per cent., when drains are run diagonally up a hill-side. The latter take water principally from the upper side, thereby becoming, in reality, only half a drain, which is bad business practice for the twentieth century agriculturist. It virtually becomes an intercepting drain, which is proper in special cases, as a header, or to head off and catch surface water, wet places and springs. When necessary to take considerable quantities of surface water rapidly, directly into a drain, a catch basin maintained at the inlet to capture the silt is a wise precaution. A load of coarse gravel or small stone placed on tile increases many fold its absorptive power. As a rule, no stone should be put back in the ditch, but should be drawn away into a common pile, for future road building material.



No. 1



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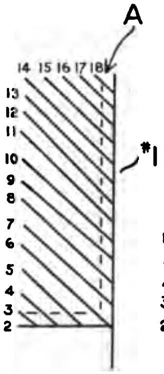

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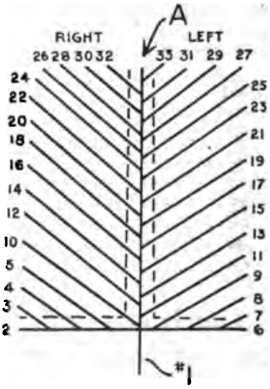


No. 4

Of the above four drain plans the first one is the best. It is easier to lay out, execute and map, costs less and is as effectual. The plans, 2, 3 and 4, will drain land properly, but they are more complicated and there is more double drained area, which is expensive. Dotted line portions, A, show double drained part which should be avoided whenever practicable. However, system 4 is just right for some cases. Referring to No. 1, laterals are 60 rods long, and if each were 3 inches and running full, an 8 inch outlet and sizes noted would be necessary. But in practice, a 5 or 6-inch outlet would probably be sufficient. The drainage plan for any given area should be adjusted according to the individual requirements, with mains and laterals large enough for extension.

The character of the soil, coarse or fine, should determine the distance apart for drains. The parallel system of drains is the best. Parallel drains of good length and depth, and so placed that the drainage reaches laterally from one to the other, promptly, are to be sought. For thorough drainage in clay soil and subsoil, laterals should be as close sometimes as 30 feet and only 2½ feet deep. Four-inch tile will give better service, while for the other extreme, in coarse open soils, as good or better drainage is obtained with 4-inch laterals, 4 feet deep, placed 4 to 8 rods apart. The larger the tile, the more it costs, yet the proportional benefit of increased aeration to tight soils is, perhaps, more than doubled, both from the standpoint of disposing of excess water and letting air into the soil.

The larger the tile, the more it costs, yet the proportional benefit

Feet apart	Feet per acre	Feet apart	Feet per acre
30	1452	70	622 2/7
35	1244 4/7	80	544 1/2
40	1089	90	484
45	968	100	435 3/5
50	871 1/5	110	396
55	792	120	363
60	726		

Our lateral drains are placed, usually, 55 feet apart and 4 to 4½ feet deep. Three-inch tile costs about $12 per 1000 pieces. Together with the digging, grading, laying and filling, the cost for 48 rods of complete and thorough drainage is $24 per acre. Some times it is much more, and occasionally less. Drainage cost depends largely upon the character of soil depth and cost of labor and material. Not a large sum for the redemption of an acre of land, 43,560 square feet, that otherwise was worthless, yet cost, as an average, $100 per acre. Improved or unimproved, interest and taxes had to be paid regularly. A large part of this drainage work was done with $1 per day labor, with corresponding prices for farm products, potatoes being one year, 1895, 15 cents to 5 cents per bushel. Three horse teams and plow are always used for opening and closing drains. Even with tile higher, wages $1.50 and money at 6 per cent. quarterly, drainage improvements of this nature will pay annually, 10 per cent. to 25 per cent. on money and labor involved, if judiciously handled.

It was our practice to locate a pair of drains, side by side, set a line of small stakes over the course, with a team open a dead furrow, and then a back furrow, which was shoveled out, replowing and reshoveling until it was 2 to 2½ feet deep. The remaining depth was all dug by hand, using modern drain tools, such as 18-inch drain spades, narrow cleaning shovels, double end tile scoops, pickaxes, etc.

The plowed portion of ditch is about 18 inches wide, but the remaining depth is narrowed down to nearly tile size and convenient working width. One should endeavor to handle as little dirt as possible. The top soil is thrown on the bank toward the sister drain and subsoil on opposite side, for economy of plowing in. That is, subsoil in a pair of drains is on the left bank of one and on the right bank of the other, and in plowing the man and team go up one drain and down the other. No furrow is carried except at the ends in going from one to the other.

The grade is cut with a double end tile scoop, either push or pull. Great care is exercised when approaching the grade line, if the fall is slight. Every low place is just one more place for the lodgement of sediment. There are various sizes of tile scoops cut groove for corresponding size of tile. Four-inch tile scoop is the right size for 3-inch tile. The tile scoop is an indispensable tool. With a light grade ¼ to ½-inch fall per rod through stony soil, the cutting of the grade groove is no joke. It has a tendency to, "arouse the monosyllables of a fellow's unsanctified vocabulary." Stones interfering with the grade line are driven down or taken out and the hole rammed with dirt. If the stone is large a piece is broken off with a steel sledge, or the tile line is curved around the easiest side.

For light grades, a spirit level sight stake or a survey should be accepted and all should be proven. The fall should never be fooled with even if it is great, but should be made uniform. The ditch could be dammed to a water level, measured and stakes driven at rod intervals at the water level. Then the dam may be removed and grade put, say 12 inches, below the first stake, second stake 11 inches, third stake 10 inches. This would give an inch fall per rod. In like manner any gradient can be established. Beware of low places. Water runs down hill and it runs the same way in a tile drain.

As soon as the grade is finished, the tile should go in at once, before a treacherous bank does. The tile should be looked through, ragged edges clipped off, sounded, examined and laid by hand, very close, end to end, turning until a good joint is secured, especially in quicksands. Then back drive with the heel and immediately pack the joints with clay; gravel, tarred paper, burlap or a good sod and prime with six inches of top soil and tramp. Quicksand should be kept away from tile joints. A drain properly laid will take the water but not the soil. If much soil enters there is trouble ahead. More dirt is shoveled in and then the plow completes the job.

As the work progresses, Y branches or tees are placed in the mains, at the proper places. Branches are marked by stakes placed on them, just below plow depth, to facilitate future location. Branches and lateral ends are always blocked by a flat stone and a wedging stone placed between it and the bank. The tile line is always closed when left.

The work should be accurately measured every day or two and notes taken on the spot, getting all data, curves, angles, branches, depth, grade digging and other items that may be of value later and the same mapped daily while the drain is still open. Water moves through the soil from space to space. Those spaces nearest the tile joint are the first to free themselves, then those spaces next these empty into them. This process continues upward and laterally, until an equilibrium is established. The water to pass off last is that midway between the drains and nearest the drain level.

Probably the most convincing argument and proof of the value of drainage is the attestation of flourishing, nearly maximum crops on land that formerly was sour, stagnant, marshy and boggy. In the writer's personal experience many acres of such land were reclaimed by tile drainage and now profitable annual crops are harvested. This farm is located 13 miles south of Rochester, at West Rush, N. Y., and consists of 57.85 acres of stony, gravelly loam soil, Dunkirk Series, underlaid with stony hard-pan, clay and quicksand. Our faith in 1894 in tile is now demonstrated by the drainage system, which totals over 10 miles of 4 and 4½ feet deep, round tile drains, varying in size from 3 to 12 inches in diameter, costing about $2,000, with, perhaps, an additional $1,000 spent on adjoining property, establishing and securing necessary outlet fall and right-of-way. This required the digging and maintenance of a large open ditch through 3,850 feet of quicksand, springs and low, marshy, partly wooded land. This is an indication of the value of an outlet which is far from perfect after all the work.

Was the work and expense justifiable? Does it pay? The following data may clear away doubts. As a direct result of drainage, 18 acres of clover, in favorable years, have several times yielded 65 tons of cured hay, the first cutting. Same number of acres in 1906 yielded 7,510 bushels of potatoes, an average of 417 bushels per acre. Eighteen acres of wheat, 1909 (after late potatoes), averaged 45 bushels by weight. Nineteen hundred and seven potato crop sales reached $2,807.89. Total receipts that year exceeded $3,500. Several times the drained land has produced $150 worth of potatoes per acre. And the half has not been told. These, of course, are the best years. In earlier days lean years were not unknown. What has been done can be done again, yet maximum crops are far from full realization. Some may say this is special truck farming. Such is not the case. It is simply common, straight farming work, well done, daily and on time. What is needed at present in agriculture is not more new knowledge, but a more vigorous application of available information. Less acres better worked, 3 to 4 feet deep.

Feeding Farm Animals

By D. P. **Witter**, Farmers' Institute Conductor

The subject of feeding animals is one that has been discussed in the Farmers' Institutes ever since they were established, and, while great advancement has been made, it is safe to say that the majority of farmers do not even now regard the balanced ration as true economical feeding.

We have in the state of New York more than 8,500,000 farm animals, including sheep, swine, cattle, horses and mules, and if we can save one cent a day per animal by compounding a more economical ration, we shall have saved to the people of the state more than $31,000,000 annually. Beside this great saving, we should prevent a loss perhaps quite equal in amount by the better health of the animals, for our leading veterinarians tell us that much of the sickness among farm animals would be avoided if they were properly fed.

I am glad to be able to speak from the standpoint of one who has worked out the problems of economical feeding and knows the benefits derived therefrom. When a young man, in a certain study of the economics of the farm, I discovered two great leaks in the stable, one in the manger and the other in the gutter. I was heavily in debt at the time and to stop the leaks, thereby cheapening production, became a necessity if we were to pay for the farm. The leaks were stopped so far as it was in my power to do so, and the debt canceled in a very few years as the result of the better practice.

There are about 225,000 farms in this state and at least as many farmers. We cannot expect that one in one hundred of the farm boys will ever see the inside of college walls as a student, and the work of the Farmers' Institute is to be a connecting link between the College of Agriculture, the State Experiment Station and the farmer in his home, carrying the latest and best known information in the agricultural world to the ninety and nine who, without the benefits of a scientific education, are trying to provide for and educate a family and pay off a mortgage. My heart goes out to that man, for I have passed the same way myself.

We are to consider only the first leak referred to, and I trust that we may so discuss the question that the information given may be carried home and made profitable.

All plants are composed of different classes of elements, each class when taken into the body, digested and assimilated, performing a separate function. From the mineral elements is grown the bony structure; from the protein elements we get the blood and lean meat; while the carbohydrates produce the fat, heat and energy of the body. For the most economical feeding these different classes of elements are not interchangeable, and, with one or two exceptions, one can not be substituted for the other. We see, therefore, the necessity of studying the occupation of the animal, finding out its needs, and supplying a ration that will meet every want of the body with the least possible cost and waste.

Chemists who have been studying these problems for a century in the old country and for more than a quarter of a century in the new world, find the requirements of a thousand pound animal for 24 hours to be about .7 of a pound of protein and 8.3 pounds of carbohydrates, digestible, to maintain life at an even weight without production, labor or growth. If more is done, additional food is required to meet the demand, for the animal must first of all live. The cow in full milk will require from 1 to 2 pounds of protein and from 5 to 7 pounds of carbohydrates, above the needs of support. Milk contains from 1 to 1¼ pounds of protein in each 30 or 40 pounds, and the food of the cow must supply it. She can not create. We find, therefore, if a cow maintains body weight and gives 30 or 40 pounds of good milk a day, she must have in her ration of digestible nutriments each 24 hours from 2 to 2½ pounds of protein, and from 13 to 15 pounds of carbohydrates.

We cannot create blood nor lean meat from carbohydrates, and that we may more clearly understand why this is so let us study the word. *Carbo,* from carbon dioxide; *hydrate,* water; *carbohydrate,* gas and water. Starch, a carbohydrate, is formed in the plant from water taken from the subsoil by the plant, and from carbon dioxide taken through the pores of the leaf, the two being united in the leaf under the influence of the sun. The starch is then carried by circulation and stored in the plant for future use. If we break down or unlock this compound, either by burning or digestion, we get out of it only that which entered into the combination. There is no ash, no nitrogen, nothing in starch, sugar or other carbohydrates, to produce growth. Valuable as these elements are in food they can not take the place of protein or the mineral elements. Let us think of them as separate and distinct in their functions in the body, as water and fire in the engine, each necessary, and the best results being obtained only when each is fed in about the proper proportion.

The most common forms of protein are lean meat, gluten of grains, white of egg and the casein and albumin of milk. The fats, starches, sugars, gums, resins, etc., are classed as carbohydrates. I have found the German standard, which is 24 pounds of dry matter for each 24 hours, and which should contain 2.5 pounds of digestible protein and 13.4 pounds of digestible carbohydrates, to be an excellent ration for the average cow in full milk. If we divide the amount of carbohydrate by the protein in the ration we have as a result the nutritive ratio, which in this case is 1 to 5.4.

During the years 1888 and 1889 I kept a very careful record of the roughage and grain fed, and weight and fat content of the milk from a large dairy, and I never departed far from the above standard without loss.

Plants do not differ in the kinds of elements they contain but they do differ materially in the amount of the compounds. In the roughage and grains most commonly fed we find the following ratios:

Alfalfa hay	1 pound of protein to	3.8	pounds of carbohydrates.
Red clover	1 pound of protein to	5.8	pounds of carbohydrates.
Timothy	1 pound of protein to	16.0	pounds of carbohydrates.
Corn ensilage	1 pound of protein to	14.3	pounds of carbohydrates.
Corn stover	1 pound of protein to	19.9	pounds of carbohydrates.
Oat straw	1 pound of protein to	33.6	pounds of carbohydrates.
Corn meal	1 pound of protein to	9.7	pounds of carbohydrates.
Oats	1 pound of protein to	6.2	pounds of carbohydrates.
Gluten feed	1 pound of protein to	3.0	pounds of carbohydrates.
Linseed meal	1 pound of protein to	1.7	pounds of carbohydrates.
Cotton seed meal	1 pound of protein to	1.2	pounds of carbohydrates.

—Cornell Bulletin, No. 154.

I have frequently found dairymen feeding their milch cows a ration much like the following:

	Pounds	Dry matter	Protein	Carbo-hydrates
Timothy hay	23	20.01	.644	10.695
Corn meal	6	5.34	.474	4.584
Oat meal	4	3.56	.368	2.272
		28.91	1.486	17.551

Ratio 1 to 11.8.

While this ration has a considerable excess of dry matter and digestible carbohydrates, it is quite deficient in digestible protein. Cows fed this ration would be wasting carbohydrates, yet the yield of milk would not be up to normal because of the lack of protein. Let us compare this ration with the following:

	Pounds	Dry matter	Protein	Carbo-hydrates
Corn silage	40	8.40	.360	5.160
Alfalfa hay	8	7.36	.880	3.384
Oat meal	4	3.56	.368	2.272
Pea meal	4	3.60	.672	2.136
Gluten feed	1	.90	.232	.699
		23.82	2.512	13.651

Ratio 1 to 5.44.

The advantage of this ration consists not only in its cheapness (as it can be chiefly grown on the farm), but in the fact that it provides for every need of the cow with the least possible waste, that the relative proportions of succulents and dry matter are approximately correct and that it gives palatability and variety, two important factors in successful feeding.

Many dairymen do not have alfalfa, ensilage or peas to feed, and while we cannot compound as good a ration without them, the following one will be found very abundant and satisfactory:

	Pounds	Dry matter	Protein	Carbo-hydrates
Mixed grasses and clover	15	13.05	.930	6.900
Corn fodder	8	4.64	.200	2.984
Corn meal	2	1.78	.158	1.528
Oat meal	2	1.78	.184	1.136
Gluten feed	2	1.80	.464	1.398
Linseed meal (old process)	2	1.82	.586	.970
		24.87	2.522	14.916

Ratio 1 to 5.9

By the aid of Bulletin No. 154, published at Cornell University, Ithaca, N. Y., the method of compounding rations for different animals is made very simple.

The so-called patent or mixed feeds are to be avoided, for they nearly always contain a large per cent. of indigestible matter and the food value is far too small as compared with the cost.

Until recent years the mineral content of a ration was not generally considered, but later investigations show that many of the by-products fed are so deficient in bone building material that the best results cannot be obtained without feeding with them some food rich in the mineral elements. The ash is not only used in bone building but also aids digestion. Alfalfa hay has about 7.4 per cent. of ash and red clover 6.2 per cent. and if either is fed as a liberal part of the ration, the ash content of the other feeds need not be considered, but if the roughage is timothy hay with 3.9 per cent. of ash, corn stalks with 1.2 per cent. or straw with about 4 per cent., then the growing animal or milch cow should have some grain such as wheat bran, cotton seed meal or linseed meal which are rich in ash. However, it should be remembered that cotton seed meal is binding in its effect and should not be fed to young animals, but may be made a valuable part of the ration when fed to mature animals in small quantities in connection with some laxative food like ensilage or other green plants. On the other hand, linseed meal is laxative in its effect and can safely be fed in small quantities to animals of all ages, in connection with food binding in its nature, such as straw, timothy hay and corn fodder.

Mature animals when at rest and not producing do not require as much food as those laboring or giving milk, but should always be fed a liberal ration, and, especially while developing their offspring, the ration should contain an abundant supply of food rich in protein and the mineral elements. The young animal should always be fed a ration sufficient in quantity to keep it growing every day from its birth until it has reached maturity, and it should be of the same combination of foods as those used for milk production.

There is sufficient evidence to prove that not only many young animals but children as well are injured, sometimes for life, by being fed a ration lacking in mineral elements in sufficient quantities to develop the bony structure of the body. I have known a section bone taken from between the knee and ankle of a Kentucky bred horse raised on the blue grass pastures, which are rich in lime, to weigh more than a section of bone from a corn fed horse of the West taken from the same place in the leg and of equal length, although the circumference of the bone of the corn fed horse was three times that of the other. I have also known children who never developed sound teeth because of the lack of sufficient mineral element in their food. If parents and feeders would look more carefully after this part of the food, there would be fewer young born with weak limbs and there would be less business for the dentist. Let us remember that the body is grown and maintained from the food eaten and digested, and if the food is deficient in any of the necessary elements an imperfect body must be the result.

Chemists have done much to help the feeder by furnishing him with the analysis of plants and grains and the amounts of digestible nutriments they contain, but the succulence and palatability of a ration, conditions he cannot measure, add much to its value. We may provide the proper ration for an animal of given weight and furnish sanitary quarters, but if the feeder would win the greatest reward for his labor, he must love his work, study the needs of each animal; and ascertain its power to digest and assimilate food.

If the farmers of New York State would depend more on home grown feeds, buying only those grains carrying a high per cent. of protein in a digestible form, and with them make their animals a balanced ration of succulent, palatable food, watch each individual animal, feed sufficient to meet its needs and provide salt and water at all times, they would, generally speaking, grow sound animals, have less sickness, and would so cheapen production that many millions of dollars would be saved to them annually.

The Profitable Cow

By John A. Ennis, Farmers' Institute Lecturer

There is one problem which seems to puzzle the great majority of dairymen, judging from the questions so frequently asked as to how a profit can be made from cows with the present cost of feeds and prices received for dairy products. That this can be done must be admitted, for in nearly every neighborhood there are one or more men who are evidently making a success of dairying, although they pay the same for feed and get the same prices for their products. There must be a factor more important than these — the profitable cow.

I have been much interested in a bulletin published by the Indiana Agricultural Experiment Station (No. 127), "Records from Indiana Dairy Herds." This bulletin gives the results from fourteen herds of which a record was kept of the amount of milk given by each cow for a year or more, the per cent. of butter fat, the milk contained, and the value of the food consumed per cow. In this way was determined not only the number of pounds of milk each cow gave, but also the feed cost per hundred pounds of milk, the number of pounds of butter it would have made and its cost per pound. These were records of the better herds, those above the average in production; owners of less productive cows were either unwilling to keep a record or discontinued it after starting to do so on finding their cows testing so low.

The best herd tested produced practically twice as much, both of milk and butter, as did the poorest, while the cost of producing one pound of butter or one hundred pounds of milk with the poorest herd was more than double the cost of production of the same with the best one. Another thing, and to me the most important of all, in several of the herds there was more than $50 difference in profit between the best and the poorest cow, and a difference, in at least one instance, of more than $35 per cow between the better and the poorer half of the herd. These figures are worth considering. In every instance the largest producing cows were also the most economical producers — that is made butter and milk at the least cost.

But I am sorry to say that all the unprofitable cows are not in Indiana. Professor W. A. Stocking, of Cornell University, has recently made a series of investigations of New York State herds. Arrangements were made with a number of dairymen in the vicinity of Ithaca to send a man on a certain day of the month to weigh the milk of each cow and to take a sample to test for fat. A record was kept of this, also of the amount of feed eaten that day by each cow, and the total for the month was computed from this day's record. (These results will be published in bulletin form, and I advise every dairyman to obtain a copy.) From these investigations I notice that there are some cows in this state not paying their owners any very great profit. For instance, I find in one herd reported that of two cows of the same age, the same length of time in milk — in fact, so far as the records show, the conditions were practically the same — one gave a net profit of $26.24 to her owner and the other a profit of $1.57. That man would have to keep seventeen like the latter to equal the profit made from one of the former; and this is only one instance.

A man told me a few years ago that he was keeping 16 cows, and that he had sold from them an average of 231 pounds of butter in one year. It became necessary to reduce his herd and, with the aid of the scales and the Babcock test, he selected 8 of the best, disposing of the remainder. The next year those he kept made 337 pounds of butter each — within 1,000 pounds of the amount he had made from the 16 the year previous. Since it cost him about $40 per head to keep his cows each year and his butter was selling at 25 cents per pound, it is easy to see where he came out. A butter maker in a cooperative creamery has assured me that he would not want to keep the cows of two of his patrons for the sums paid them during the past year for butter fat, while to another he had paid something over $100 per cow.

I could give other illustrations from my observations, but think these will suffice to show that the unprofitable cow is largely responsible for the small profit derived from many dairies; that it behooves us first to find out which she is and then to replace her with something better as soon as possible.

To detect our poor cows it is necessary to learn two things, first, the quantity of milk each individual cow in the herd gives and second, the amount of butter the milk from each cow will make. Weighing the milk is a very simple process. A good spring balance weighing tenths of pounds is best for this purpose, and can be had from any dairy supply house, costing from $3 to $3.50. See that the pails are all of the same weight — a few drops of solder on the lighter ones will do that. With the pail on the scales, set the dial at zero, then, without any mental arithmetic, you can tell at a glance the amount of milk in the pail. Many are using, in the same way and with reasonable satisfaction, a little dial scales having a platform, but the objection to this is its weighing in ounces which requires too much time to work out the problem. Many dairymen are obtaining satisfactory results by discarding half pounds and less and counting larger fractions as pounds. Then you need a record sheet. This you can make for yourself or get from a dairy supply house at small cost. I am informed that the Commissioner of Agriculture is making arrangements to supply these sheets to dairymen who will promise to use them regularly.

It is most satisfactory to weigh every day, since this enables you to know at once if the cow is not giving her normal amount of milk and perhaps discover the cause. In this way your attention may be called to a poor or careless milker; and further, it will be an inducement to almost any milker to try to keep up the records of his cows and improve them if possible. Or if you think daily weighing too great a task, try one day a week — the same day of the week — and multiply the total by seven. This plan has been found to give very good results, but the weighing is more apt to be forgotten or put off because of other work than if it were done every day. For this reason I hesitate to recommend it. If you think you cannot weigh the milk every day or even once a week, weigh once each month. Weigh it and keep a record of the weights; you will never regret it. It may catch your pet cow that gives a pail full of milk and froth, mostly froth, for a few days when fresh and then dwindles down to a few pounds, and you remember the full pail and forget the rest of the year. So weigh the milk and you will be glad that you did.

Then comes the testing, for when we know the quantity of milk the cow gives we know only the half; we also want to know the quality. Thanks to Dr. Babcock, we have a simple method of determining this by means of the Babcock test, a machine that any person can operate by following a few plain directions that come with each one and by taking pains to do careful work. Operating this machine is good practice for young people, either boys or girls; in fact, they will usually do more accurate work than older and busier persons, and it is a good way of getting them interested in the farm.

This testing should be done once a month, although every two months will answer if you can do no better. In any case, compute from the amount of milk given during the period of which the testing day is the middle; for instance, if the test is made on the fifteenth of the month, compute from the amount of milk given during that calendar month.

Perhaps that part of the testing requiring the greatest care is taking the sample. A proportionate amount of milk should be taken from each milking for the day, after thorough mixing, and these samples should be well mixed before measuring into the test bottles. It is wise to make duplicate tests for a time, at least, and if they agree they are probably correct.

In many places is being formed what is known as a Cow Testing Association. A person is employed by a number of dairymen in a neighborhood to visit each dairy in succession at a specified time, weigh the milk for the day and take a sample for testing, this being done as often as practicable. In the meantime, each dairyman keeps a record of the milk of his own cows. If a dairyman finds it inconvenient either to do his own testing or to join an association, perhaps some schoolboy or girl would be glad to earn some money after school or on Saturday by doing this work, or the butter-maker from a nearby butter factory may be willing to do it if paid for it. The principal thing is to get it done; you will find that it will pay you.

"But," you say, "when we have found out our poor cows, what are we going to do about it?" This is just what I want to call to your attention next. If you have not a full-blooded sire already, get one as soon as possible, selecting the breed you want and one whose ancestors are as near what you want as you can find. There are four great dairy breeds: Holstein, Ayershire, Guernsey and Jersey. It has been demonstrated that the first two will make not only a quart of liquid milk, but a pound of milk solids more cheaply than the last two, and that the last two will make a pound of butter fat more cheaply than the two first mentioned. With this knowledge you should be able to make an intelligent choice, and having made that choice keep in mind that each of these breeds has been bred for a specific purpose for many generations and that many men have spent their whole lives in bringing them up to the present standard of excellence. So do not try to improve the breeds by mixing them; choose a breed and stick to it.

The man who starts to-day to save the heifer calves from a well-bred sire and the cows that the scales and Babcock test show him are profitable is bound to win, because there are fewer good cows for sale in this state; and those that are for sale command higher prices than ever before. The demand for dairy products has increased during the last few years by leaps and bounds, and as the quality continues to improve, as it will, the demand will continue to grow with a resulting demand for good cows, assuring success to the man able to supply them.

Bulletin No. 322 of the Geneva Experiment Station, by G. A. Smith, and the investigations of Professor Stocking, of Cornell University, on this subject are worthy of your study.

Determine to know what each individual cow in your herd is doing. You probably will find some that are not doing much more, if any, than paying for the food they eat. Get rid of them; do not keep them for their society, you can find better. Replace the poorer ones left with others as fast as you can grow them, and in ten years, probably less, you will wonder how you ever came to keep such unprofitable cows.

Care of the Feet and Teeth of the Horse

By C. W. Brodhead, V.D., Farmers' Institute Lecturer

CARE OF THE FEET

The horse belongs to the same family as the tiger, rhinoceros, and elephant. In its original condition it was an animal no larger than a fox, with five toes like the other animals mentioned. In the course of evolution, however, its size has changed until in many countries we find it weighing 2,500 pounds, while in the long period of changing it has now only one toe, with the rudiments of the former five toes showing only in what are called the splint bones. In many cases they are grown to the cannon bone, so that the horse is now called a solipede, or solid hoofed animal. The hoofs are, in many cases, poor and ill shapen from birth by carelessness on the part of the breeder in not taking into consideration of the hoofs of the sire or dam.

Many years ago I made the discovery that about 90 per cent. of the colts born were straight footed and all right, but at three or four years of age, 85 per cent. were crooked footed. They rolled over either on the outside or from the inside, causing the feet to toe either in or out. The mystery I could not then solve nor could I get a satisfactory answer from the best authority we had. I then started a series of investigations covering about five years and this is what I found: That in the long cold winters of the northern states the colts were put in the box stall or straw shed and kept there for four or five months on the straw, or in many cases their own manure and straw and litter, and as there was nothing to wear against the hoof it grew to a great length, that part next the ground becoming thin and brittle, so that when turned out to pasture on rough, stony and side hill pastures one side or the other broke off. That threw the weight more on one side and the hoof kept wearing away, until the whole anatomy of the foot and leg was changed to conform to the condition of the hoof.

To remedy this, take the colt to the blacksmith in the spring and have the feet pared just as if you were going to have it shod, or you may be able to do this yourself. Keep this up until it goes to the forge to be shod and you will not be troubled with horses with crooked feet. On the other hand, if the unshod colt goes to the forge with crooked feet, the smith has a constant warfare with the horse which will always wear out the lowest side of the shoe first.

Now, I wish to warn the owner of a colt to look well to its feet during the colthood days. Such troubles as ring bones, side bones and spavins are, in many cases, brought on by the hoof being crooked, thus throwing too much strain on an unequal balance. Never keep a colt standing on a hard board floor which is too drying to the hoof, or on a sloping one which puts too much strain on the back cords. This applies to the old horse as well as to the colt. Never allow the smith to put a shoe to the hoof hot enough to burn or scorch it, as that closes up the little tubes, resulting in a dry, brittle and weakened foot. Too large nails, filing deep creases under the nails, rasping the outer wall of the hoof, breaking the enamel or varnish covering will cause the drying up of the hoof, which is in many cases the starting point of contractions and finally corns. Always keep the foot of a colt or horse in as natural condition as possible, and if the feet do become dry and hard, use the veterinary petroleum, which will soften, hasten growth of, and toughen the hoof. Do not use any animal or vegetable oils on the foot, as serious results will ensue, if followed to any length of time, the minute tubes that go to make up the hoof thus becoming closed.

In a description of the foot of the horse, it is customary to include only the hoof and its contents; yet, from a zoological standpoint, the foot includes all the leg from the knee and the hock down.

The foot of the horse is undoubtedly the most important part of the animal, in so far as veterinary surgery is concerned, for the reason that this member is subject to so many injuries and diseases which, in part or in whole, render the animal unfit for the labor demanded of him. The old aphorism, "No foot, no horse," is as true to-day as when first expressed. In fact, domestication, coupled with the multiplied uses to which the animal is put, and the constant reproduction of hereditary tendencies, have largely transformed the ancient "companion of the wind" into a very common piece of machinery, which is often out of repair, and, at best, is but short-lived in its usefulness.

Since the value of the horse depends largely, or even entirely, upon its ability to labor, it is essential that its organs of locomotion should be kept sound; and to accomplish this end it is necessary not only to know how to cure all diseases to which these organs are liable, but, better still, how to prevent them. An important prerequisite to the detection and cure of diseases is a knowledge of the construction and function of the parts which may be involved in the diseased process; hence, first of all, the anatomy must be understood.

The bones of the fetlock and foot constitute the skeleton on which the other structures are built, and comprise the lower end of the cannon bone (the metacarpus in the fore leg, the metatarsus in the hind leg), the two sesamoids, the large pastern or suffraginis, the small pastern, or coronet, the coffin bone, or pedis, and the small sesamoid or navicular bone.

The cannon bone extends from the knee or hock to the fetlock, is cylindrical in shape, and stands nearly or quite perpendicular. The sesamoids occur in pairs, are small, shaped like a three-faced pyramid, and are set behind the fetlock joint, at the upper end of the suffraginis, with the base of the pyramid down. The suffraginis is a very compact bone, set in an oblique direction downward and forward, and extends from the cannon bone to the coronet. The coronet is a short, cube-shaped bone, set between the suffraginis and coffin bone in the same oblique direction. The coffin bone forms the end of the foot and is shaped like the horny box in which it is enclosed. The navicular bone is short, flattened above and below, and is attached to the coffin bone behind. All of these bones are covered on the surfaces with a cartilage which goes to make up the joints, while the portions between are covered with a fibrous membrane called the periosteum.

The joints of the legs are of especial importance since any interference with their function very largely impairs the value of the animal for most purposes. As the joints of the foot and ankle are at the point of greatest concussion, they are the ones most subject to injury and disease. There are three of these joints, the fetlock, pastern, and coffin. They are made by the union of two or more bones, held together by ligaments of fibrous tissue and are lubricated by a thick viscid fluid called synovia, which is secreted by a special membrane inclosing the joints. The fetlock joint is made by the union of the lower end of the cannon and the upper end of the large pastern bone, supplemented by the two sesamoids, so placed behind the upper end of the pastern that the joint is capable of a very extensive motion.

These bones are held together by ligaments only one of which, the suspensory, demands special mention. The suspensory ligament of the fetlock starts from the knee, extends down behind the cannon lying between the two splint bones, until near the fetlock, where it divides and sends a branch on either side of the joint, downward and forward, to become attached on the sides of the extensor tendon at the lower end of the pastern bone. As it crosses the sesamoids on the posterior borders of the fetlock, it throws out fibers which hold it fast to these bones.

The pastern joint is made by the union of the two pastern bones. The coffin joint is made by the union of the small pastern, coffin, and small sesamoid, or navicular bones, the latter being set behind and beneath the joint surface of the coffin bone in such a way as to largely receive the weight of the small pastern.

Three tendons serve to move the bones of the foot one on another. Two of these flex or bend the joints, while the other extends or straightens the column of bones. The flexor pedis perforans, or deep flexor of the foot, passes down behind the cannon bone, lying against the suspensory ligament in front, crosses the fetlock joint in the groove made by the union of the two sesamoids, and is attached to the bottom of the coffin bone, after covering the navicular, by a wide expansion of its fibers. The function of the tendon is to flex the coffin bone and with it the horny box. The flexor pedis perforatus, or superficial flexor of the foot, follows the course of the preceding tendon and is attached to the middle of the ankle. The function of this tendon is to flex the foot at the fetlock. The extensor pedis runs down in front of the leg, is attached on the most prominent point of the coffin bone, and has for its function the straightening of the bones of the ankle and foot.

The bones, ligaments, and tendons are covered by a loose connective tissue, which gives a symmetry to the parts by filling up and rounding off, and all are protected by the skin and hoof.

The skin of the fetlock and ankle is generally characterized by its thickness and the length of its hairs, especially around the hind parts of the fetlock joint in certain breeds of horses. The most important part of this envelope is that known as the coronary band. The coronary band is that portion of the skin which secretes the horn by which the wall of the hoof is made. This horn much resembles the nail which grows on the fingers and toes of man. It is composed of hollow, cylindrical tubes, extending from the coronary band to the lower border of the hoof, which are held together by a tenacious opaque matter.

The hoof is a box of horn, consisting of a wall, sole, and frog, and contains, besides the coffin, navicular and part of the small pastern bones, the sensitive laminae, plantar cushion, and the lateral cartilages.

The sole of the foot incloses the box on the ground surface, is shaped like the circumference of the foot, except that a V-shaped opening is left behind for the reception of the frog, and it is concave on the lower surface. The sole is produced by the velvety tissue, a thin membrane covering the plantar cushion, and other soft tissues beneath the coffin bone. The horn of the sole differs from the horn of the wall, in that its tubes are not straight and from the fact that it scales off in pieces over the whole surface.

The frog is a triangular shaped body, divided into two equal parts by a deep fissure, extending from its apex in front to the base. It fills the triangular space in the sole to which it is intimately attached by its borders. The horn of the frog is produced in the same manner as the sole, but it differs from both the wall and sole, in that the horn is soft, moist, and elastic to a remarkable degree. The function of the frog is to destroy shock and to prevent slipping.

The sensitive laminae are thin plates of soft tissue, covering the entire anterior surface of the coffin bone. They are present in great numbers, and, by fitting into corresponding grooves on the inner surface of the horn of the wall, the union of the soft and horny tissues is made complete.

The plantar cushion is a thick pad of fibrous tissue, placed behind and under the navicular and coffin bones, and resting on the sole and frog, for the purpose of receiving the downward pressure of the column of bones and to destroy shock.

The lateral cartilages are attached, one on either side, to the wings of the coffin bones by their inferior borders. They are thin plates of fibro-cartilage, and their function is to assist the frog and adjacent structures to regain their proper position after having been displaced by the weight of the body while the foot rests on the ground.

CARE OF THE TEETH

Now, in taking up the care of the teeth, I wish to show you how closely the feet and teeth are allied to one another. To prove this I will make four propositions. We will take the interfering horse and discover the conditions causing it to interfere.

A man comes to my shop and says, "My horse interferes." I look it over; it is poor, weak, and emaciated. Now, this is the trouble with one-fourth of the horses that interfere.

A second man drives up and we look over his horse. Everything seems all right until we discover that the breeching is about four to six inches low on his body. By adjusting that to its proper height it interferes no more. One-fourth of the horses interfere from bad adjustment of the breeching, as in going down hill or over uneven ground the legs are drawn together causing the ankles to hit.

Man the third drives up. In examining his horse, we come to the teeth, which we find to be cutting the cheeks and tongue. Probably a hollow or split tooth causes it to side line and toss its head, the result being that its head goes one way and its feet the other. So we have one-fourth of the horses interfering from tooth trouble, and in my long experience I find that only about one-fourth of the horses interfere from faulty conformation or bad shoeing.

Dental formula of the head of the horse is as follows. It has forty teeth, the mare only thirty-six as she is minus the canine or tusks. The upper jaw is one and one-half inches to two and one-half inches wider than the lower jaw, the grinding surface being concaving and convexing, the long points on the outer side toward the cheek. On the lower jaw the teeth are longer on the inside; bearing towards the tongue which makes the grinding surface the lower on the outside.

The horses teeth change from birth until death; hence they need the care of the dentist all through life. It begins to shed its milk teeth at two and one-half years of age, and, generally speaking, should have a full mouth when five years old. This, however, is not always true, for I have had many at six years old that had not shed all, a fact probably due to bad keeping.

Many times in the colt, the new teeth, crowding out the old shells, turn against the cheek causing ulcers and raw sores, the lower teeth causing the same trouble on the tongue. Hollow, split and decayed teeth are just as common in the horse as in the human family, and are subject to the same laws. They need attention, but do not trust your horse to the quack who may do more harm than good. The colleges of the day are graduating men for this work. You can make up your mind that your horse's teeth need the attention of the dentist if it shows any of the following symptoms: Staring coat, hide bound, scouring when driven, slobbering, dropping half chewed feed in the manger, quidding, gnawing the manger, running at eyes, side lining, tossing the head, periodical balking, and many other troubles that I cannot here mention. Painful mastication and resultant indigestion, the primary cause of most stomach troubles of the horse, are due to defective teeth. Look well to your colts' teeth during the shedding period.

Pork Production

By Calvin J. Huson, Farmers' Institute Lecturer

I fear that the subject on which I am to speak for a little time may not prove of interest to all of this audience. For some reason, not easily explained perhaps, swine seem always to have occupied the very lowest place of all our domestic animals in the affections of mankind, and the occupation of the swineherd has during all the years of the past and in every land been regarded as one of the lowliest of employments.

As long ago as when the prodigal son, who took his patrimony and started out so full of hope to see the world, had squandered all he possessed, to illustrate the dire distress and abject poverty of the situation to which he had brought himself, it is recorded that he hired himself out to tend a herd of swine. It is recorded in Holy Writ that when the Great Teacher was upon the earth, and cast out the devils from the suffering man, they took possession of a herd of swine feeding in a field afar off. And even to this day some of us may at times feel that we have reason to believe that we may have in our herds some lineal descendants of that famous devil-possessed herd; but such can hardly be the case, as we read a little further on in the same high authority that after the devils possessed them, they rushed violently down a steep hill into the sea, and all were drowned, and so left no descendants to trouble us.

The swine of to-day, however, bear but a slight resemblance to those of that remote period. By a process of evolution and elimination, by the application of the principle of the survival of the fittest, in the hands of the careful and painstaking breeder, they have attained as high a degree of perfection as any of our domestic animals, and are doing their full share towards promoting the prosperity of the agricultural interests of this country.

And yet, in spite of this fact, there are many of us, particularly here in the East, who still regard the pig as a sort of necessary evil on our farms, kept for the purpose of replenishing the family pork barrel once a year and consuming such farm products as have no commercial value and might otherwise be wholly wasted. It is rare indeed to find a farmer who gives to his pigs the same intelligent care and attention he gives to his horses, his cows or his sheep. Yet there is no animal that responds so quickly to good treatment and generous feeding as the lowly and despised pig, or that will degenerate as rapidly if neglected or poorly fed.

Those of us who have not kept in close touch with the subject have but a very general idea of the magnitude of the swine industry in this country. We all know in a general way, of course, that there are several million more pigs in America than sheep, and when we stop to consider that a pig multiplies at least ten times as rapidly as a sheep, we begin to get some definite idea of the vast multitude born into the world every year. There are slaughtered for commercial pork purposes alone in this country, on an average, more than 100,000 pigs every working day, and there is being paid to the farmers for this vast product at least $1,500,000 every day in the year. And this does not include the unnumbered thousands killed on the farm for home consumption.

The swine industry has developed into one of the largest and most profitable branches of animal husbandry. The great bulk of our pork and lard and other pork products comes from the Middle West, that section of our country known as the "Corn Belt," where land values have been steadily advancing year after year while ours here in the East, excepting in some favored spot, have been standing still or going backward. The farmers of the Corn Belt do not, however, owe their prosperity solely to the fact that they are able to produce such tremendous crops of corn, but the prosperity of that section is due, in some measure at least, to the fact that year after year a considerable portion of their corn crop is marketed in the form of pork and lard.

I am not here to argue that we should undertake the production of pork on anything like the scale or in the manner practiced in the section to which I have referred, for I do not think that it would be practical or generally successful. Nor am I here to say that we should keep less cows and sheep and more hogs, for I believe in cows and sheep and think we should have more of them on our farms. I am here rather to suggest to you, and to give the reasons for the suggestion in so far as I may be able, that there is scarcely a farmer in all this eastern country so situated that he cannot add materially to his income, without greatly increasing his cares or labors, by the intelligent production of pork, in a moderate way and as a side line on his farm.

The farmers of this state produce but a small percentage of the pork and lard consumed by the people of the state. In view of the largely increasing demand from year to year for all kinds of pork products, and of the continued high prices paid for such products, is it not the part of wisdom and good business judgment for the farmer here in the East to greatly increase his production of pork and be able at least to supply the local demand right here at home?

There is a very noticeable tendency on the part of the farmers in nearly every section of the country to become specialists, that is, to devote their time and energies to the development of some single crop that experience has shown is best adapted to the soil, the climate and conditions of that particular locality. The products of our farms have been and are being very largely increased by this process, but there is sometimes a tendency, perhaps, to carry this idea to a dangerous extreme. When a man ascertains after years of experiment and trial, what crop will yield the largest amount and give him the best returns in dollars and cents, it is the part of good business judgment to make the production of that crop the leading feature of his farming operations. Yet it may well be doubted whether it is the part of prudence to carry that principle to the extreme of risking our entire farming operations on the hazard of a single crop. Would it not provide an element of safety and stability if we grouped about our principal money crop those things that could be produced on our farms to advantage, not to such an extent or in such quantities as would at all interfere with the production of our principal crop, as a dependence and protection in case disaster should ever come to the crop upon which we principally rely?

It is the history of every agricultural country that animal husbandry must enter into the farming operations of the people if the fertility of the soil is to be preserved and handed down to the succeeding generations with its productiveness unimpaired. Swine husbandry presents some advantages over other branches of animal husbandry, not only as a means of quickly increasing the revenue from the farm, but also as a means of conserving the soil fertility and building up and restoring depleted soils. Pork production appeals strongly to the man of limited means, whose situation is such that he can invest but a small amount in breeding stock and desires quick return. A man may invest from $25 to $50 in a single brood sow and in 8 or 9 months thereafter put on the market a ton of pork worth, at the present prices, $250.

Right here in the East we have the best market for our pork products to be found anywhere in this whole country. Our great cities and manufacturing towns, now drawing their supply almost entirely from the West, will ever provide a splendid local market for all we can produce, at satisfactory prices.

Pork in some of its various forms will always remain the chief meat diet of those who work with their hands, for it has been demonstrated by our scientific men that there is more muscle making energy in a pound of well-made pork than in a pound of either beef or mutton. The attractive manner in which pork and pork products are put on the market by the great packing houses of the country has done much to popularize it among all classes and greatly increase the consumption. So it will be seen that the swine industry stands on a very firm foundation and is doing its full share towards increasing the wealth and promoting the general welfare of the country.

To succeed in swine raising one must give attention to those little matters of detail, so necessary to success in any branch of animal husbandry, and so easily overlooked or neglected because they seem small and trivial. If the farmers of the eastern states would give to their swine the same intelligent care and attention they give their horses, their cows and their sheep, first in their selection, second in their breeding and third in their feeding, the lowly and despised pig would do the rest, and would soon occupy the proper place on our farms. Thus the swine industry would receive a great impetus.

To succeed with swine, as with other animals, we must start with good stock; not that they need be high-priced, fancy stock, for these are oftimes sadly disappointing, but they should be bred on such lines as to be able to reproduce themselves with fidelity. A man may exercise intelligent care in the selection of his dairy cows and in his breeding ewes and be quite indifferent in the selection of his swine. In these days when every man is striving for the best, there is no place anywhere for the scrub or mongrel of any breed of animals. They are being weeded out of our dairy herds, our flocks of sheep and to some extent, but much more slowly, from our swine.

One of the requisites of success in swine breeding is that our brood sows should be tame and docile. A sow that will show signs of fear or hostility at the approach of man is generally an unprofitable animal in any herd. She is naturally most timid and sensitive. If you have her confidence she will follow you anywhere without fear or hesitation, as no other domestic animal, save the dog, can be taught to do. If she regards you with suspicion or you attempt to drive her, she quickly exhibits those traits of stubbornness and obstinacy characteristic of her race. So we must have her confidence and she must be treated kindly and made tame and docile, if we are to have the full measure of success. A daily visit to her quarters for a time preceding the event of the expected litter and a few moments spent scratching her back or stroking her ears, until she will welcome your approach with a grunt of satisfaction, is time well employed. When the little ones arrive these visits should be continued and when the timid little pigs see you are welcome and the mother gives no sign of fear or hostility, they will soon gather about you and nibble at your shoes and clothing, allowing you to handle them without exhibiting the least sign of fear. Indeed, they will ever afterward look upon you as their friend, unless you commit some overt act to forfeit their friendship. A pig started in life in this manner has a great advantage over one that regards man as its natural enemy.

A pig that can be grown to marketable weight in the quickest time on the least food is the most profitable pig. And so we must start them on their way to their final doom as rapidly as possible. They must be taught to eat and the careful, painstaking man may provide a small trough, so situated that the mother can not have access to it, and supply them with milk in small quantities. But unless the trough is thoroughly cleaned out with hot water every time it is used, this had better be omitted until they are older and better able to withstand the perils that lurk in the unclean trough. Instead of the milk they may be given a small quantity of dry middlings which they will soon learn to eat.

To have pigs for the September or October market they must be born early in March, when the weather is cold, and they must be closely housed. The little fellows have nothing to do but nurse and sleep, get but little exercise, and all of us have seen our fattest and most promising pigs die with what we call the "Thumps." A little care on the part of the owner will dispel entirely all danger from this source. A slatted partition across the pen so arranged that it will slide up and down, and the little ones placed on one side, where they will run up and down in an effort to get to their mother, will give them needed exercise and cause them to grow and lengthen out as they will in no other way. The partition is slid up at noon to enable them to nurse, and they are then again separated but permitted to remain together over night.

The prudent man gives the teeth of the little ones careful attention. Frequently it will be observed that one or more pigs in a litter do not grow and thrive as their mates. The hair appears dull, they do not take on flesh and occasionally one may be seen with its tongue protruding from the side of its mouth. These little fellows are being reared under entirely unnatural surroundings, and an examination will probably show that the teeth of those that do not thrive are exceedingly sharp, so that the gums and tongue are cut and lacerated, and therefore they do not take the food they should. It is the work of but a few moments, with a pair of small pinchers, to cut off the sharp points of these troublesome teeth, and then smoothe them off with a very small, flat file, thus affording almost instant relief. And it is surprising to observe how quickly they commence to grow and thrive, soon catching up with the rest of the litter.

Weaning time is the most critical period in the life of the small pig. How frequently do enterprising breeders offer for sale young pigs, six weeks and sometimes five and even four weeks of age. And how many promising pigs have been retarded in their growth and permanently stunted by being deprived of their natural sustenance at this early age. Pigs should never be separated from their dam until seven weeks of age and it is much better both for the pigs and for the dam that they be left together until they are eight weeks old, and still better if they are not weaned until they are ten weeks old. In weaning it is the too general practice to take the little pigs away from their dam and shut them up in a small pen. Deprived of their mother and their accustomed surroundings at the same time, they fret and mourn and frequently refuse to eat until half starved. Their growth and development is greatly retarded or wholly stopped for days or weeks, and a single day lost in the growth and development of the young pig can never be regained. When pigs are weaned they should never be taken from their familiar surroundings. On the contrary, the sow should be removed to a place out of sight and hearing of the little ones and fed in such a manner as to stop the milk flow. The pigs should be kept in the same place and fed from the same trough as when with the dam. Under such circumstances they will scarcely miss her and their growth and development will go on unchecked. Pigs weaned in this manner have a great advantage over those taken from the dam and shut up in a strange place.

In raising swine or in the production of pork no one should rely upon concentrated or grain foods alone. Forage crops of different kinds can be easily and cheaply grown that will provide abundant pasturage from early spring until late in the fall. A paddock or small patch of rye, sown in August or early September, will be the first available green thing in the spring, and pigs thrive and grow wonderfully on it. Before it is eaten too closely a paddock of clover becomes available, followed in quick succession by a patch of rape and then of oats and peas. By this time the rye, if not eaten too close in the early spring, will have matured a fair crop of grain into which they may be turned without danger of a single kernel being wasted.

When pigs are on pasturage they can be fed grain more economically and with greater profit than at any other time and the summer season is the time to produce pork most cheaply and economically. Early spring pigs raised in this manner should be ready for market in September or early October, ordinarily the best market of the whole year, and should weigh from 175 to 250 pounds at the age of six months.

Fall pigs are less profitable as a general proposition, but if the same general plan be followed a substantial profit will result. Alfalfa, clover and sorghum in the order named are among the best coarse foods obtainable and it is surprising how large a quantity a growing pig or brood sow will consume. Quite recently molasses has been added to the grain ration by many breeders and with very gratifying results. Refuse beans are also good, where they can be obtained at a low price, and while they are not naturally relished by swine, if in cooking there be added a quantity of molasses or a few potatoes or cabbages or onions, they will be eaten greedily and give splendid results. If these or similar foods be provided during the winter months in liberal quantities, there can be a great saving of the grain ration and as rapid gains made as though fed wholly on high-priced grains.

With pigs that are to go to the butcher at six or eight months of age, we need give but little attention to the growth of the bone or development of muscle. But for pigs intended for years of usefulness in the breeding herd, this is of the highest consideration. They should be grown more leisurely and not allowed to take on much fat at an early age. With sufficient range to insure vigorous exercise and abundant pasturage, supplemented by a grain ration that will make bone and muscle rather than flesh, they are brought to maturity full of life, health and vigor and will render profitable service for six, eight and frequently ten years in the brooding herd.

One of the reasons that some people do not meet with greater success with swine is that they constantly use young and immature breeding stock. In some localities it is quite customary to raise but one litter from a sow and then fatten her with her brood and retain the most promising sow pig in the litter for the brood sow for the following year. This course can not give best results. A brood sow does not reach full maturity and usefulness until two and a half or three years of age and should be kept in the breeding herd as long as she will produce two fair-sized litters a year.

A word in regard to breeds. That is usually a somewhat delicate question to discuss, but my notions concerning it are so different from those of most men engaged in breeding pure-bred animals that I think I may safely refer to it. There is not the wide difference in breeds or types there formerly was, and that difference is growing less and less every year. The butcher, in a large measure, dictates the type of pig we shall grow, of whatever breed it may be. While this is true to a certain extent of beef cattle and mutton sheep, it is more forcefully illustrated in the case of the pig. With even beef cattle the milk is quite a consideration as well as the meat and they are raised with both objects in view. And with sheep, even of the mutton breeds, the wool is quite an item to consider. But with the pig it is different. There is no milk or wool to take into account. It is valuable for its meat alone. The pig that will attain to the largest size in the shortest time on the least grain and command the highest price in the market is the type of pig we must raise, and whether we do it with a Chester White or Berkshire, a Duroc Jersey or Poland China or any other breed is not a matter of very great consequence. The market requirements are resulting in bringing the various breeds more nearly to a common type. Whatever breed we may be interested in, we must so mould or fashion it as to most nearly meet the market requirements. Some may succeed best with one breed and some with another, but any breed is better than no breed. There does not seem to be the wide difference in breeds that formerly existed. There is a more general coming together toward a uniform type. And this is also true in regard to mutton sheep. There used to be a wide difference between the compact little Southdown and the Shropshire; and a still wider gulf between the Shropshire and the Hampshire, but it seems to be growing less. The little Southdown is growing larger, and the big stately Hampshire has become more compact, with less daylight under him than formerly, and this general tendency is observed to a greater or less extent in all our domestic animals whose chief function is the production of meat.

But it is of the utmost importance that the different breeds should be kept pure and the characteristics of each breed preserved. It would be a sad blow to the animal husbandry of this country if the various breeds of swine, or of sheep or cattle should become so commingled that any one separate and distinct breed should lose its identity or its peculiar characteristics, or even its color or markings. And so men are engaged in the breeding of pure-bred animals and record associations for every breed exist for the purpose of keeping and preserving accurate records of the ancestry of such animals.

How often have we heard some one say that if he found the boar, or the ram or the bull that suited him in type and form and individuality, he didn't care for the pedigree. And the too frequent putting into practice of that idea has done more to retard the general development of our domestic animals than any other cause. No one can afford to breed a scrub of any breed. If he was the sort of man who would be moderately successful by doing so he would be the man who would have marked success with better animals.

I know a man who once thought he knew more than all the men who had been working for half a century or more in raising the various breeds of swine to their present state of perfection; and he mated a pure-bred Chester White sow with a high-class imported Berkshire boar. Nothing very wrong in that if he made pork of all pigs resulting. He had a beautiful litter of pigs, all white, of course. Their breeding was very fine, he argued, for in their veins was as good Chester White and Berkshire blood as could be found. This man selected the best boar pig in the litter and grew him to maturity, and he certainly was a beautiful pig. He had the erect ears, short dished face, arched back and aristocratic bearing of his sire and the length and color of his dam. This boar was used in that community to the neglect of all pure-bred sires of every breed. And with what result? The crop of pigs was a large one, but no two were alike. They were of every conceivable shape and color. They were ringed, streaked and speckled; a miserable mongrel set, raised at a loss to their owners. The failure of this pig as a sire was due to the fact that he was not entitled by inheritance to the qualities he possessed. He was the chance product of a violent cross. Two distinct and widely separated blood lines were in his veins. He could not reproduce himself. All the defects of his ancestors for generations back came to the surface in his offspring. And a pure-bred animal may sometimes be bred on such lines as to furnish no assurance whatever that he will be able to reproduce himself with any degree of fidelity. So we must have first the animal of the type and form we desire to reproduce and perpetuate in our flocks and herds, and secondly we must have his pedigree as a guarantee that such animal is not a chance product but is entitled by birth and inheritance to the qualities he possesses.

Of almost equal importance, perhaps, to the breeder is the man behind the animal and the pedigree. He must be a man of intelligence. He must be a man of perseverance and courage. He must be familiar with the intricacies of the numerous families or strains of the breed in which he is interested. He must possess the skill and discernment to know when and how to carry two or more blood lines along in parallel columns, drawing them closer together here and there in order to more firmly fix some desirable trait or characteristic, and to be able to perceive the necessity as it arises of infusing a dash of fresh blood to insure stamina, size and vigor. When he has given his best care, his best thought, the best years of his life to the wonderful problems of breeding, he finds that many of them still remain unsolved and unfathomed.

The Food Value of Milk, Butter and Cheese

By Laura Rose, Farmers' Institute Lecturer

The stomach and the moral nature are in intimate sympathy with each other, and the great process of digestion or assimilation underlies the whole human structure. Upon it depends to a large extent the mental and moral growth. Therefore, what we shall eat and how it shall be prepared should be the essential carethought of the housewife.

We must concede that milk and its products have not been given their full value or proper place on our diet list.

Milk is the natural and first food of life. It is sometimes called the one perfect food, containing all the constituents in the right proportion. It is peculiarly adapted to the human stomach and contains all the elements necessary for the growth of the infant body. A healthy stomach will absorb milk as readily as a sponge absorbs water. Why, then, not take more milk and less bulky, fibrous food and so relieve the digestive system of some of its hard work? Milk is the sole food of the infant man during his frailest and most critical period. Milk is the diet the doctor prescribes when sickness takes away health and strength. Milk is the great solace of the enfeebled aged.

Children especially should be encouraged to take milk with their food, in place of tea or coffee, for, instead of being harmful as in the case of the latter beverages, it furnishes nutriment as well as drink. A glass of hot milk with just a dash of red pepper and a little salt in it acts as a wonderful stimulant, and if taken when one has a weary, over-taxed feeling many a bad cold or sickness may be averted.

But milk to be wholesome must be pure. Cleanliness in every detail is necessary. Yet there is such scope for slackness and so much slackness is practiced, that it accounts to a great extent for the small quantity of milk used. People say, "I cannot bear milk, it has such a 'cowy' taste and smell." Real, clean milk from properly fed cows has very little taste or smell, and when there is anything unpleasant about it, it is well to investigate matters. Milk readily absorbs odors and can quickly become infested with bacteria if put into unclean vessels. Good, clean milk ought to keep sweet for forty-eight hours, if left exposed in a clean room at a temperature of 68° Fahrenheit.

The supplying of milk to cities has become a great and serious question. The establishing of laboratories where pasteurized, pure milk is furnished for the use of infants and invalids has helped in saving many lives. Thirty per cent. of all deaths occur during the first year of existence, and the larger portion of these can be traced to the use of bad milk. Very often chemicals are put into milk to keep it sweet longer, but this is a dangerous practice and cannot be too strongly condemned.

Milk is frequently diluted with impure water, and in this way disease germs find access to the human system. If there be any doubt about the purity of the milk, or if it is apt to sour before being used, the easiest, safest plan is to heat it to a temperature of 180° Fahrenheit and then quickly cool.

The housewife, to use milk economically, will pay due regard to the value of the cream and skim milk. Do not stint the milk supply. Better buy less meat. In my own home, since we have kept no cows, when we get the milk we scald it and then set it aside in a cool place till the next morning when the cream is removed. We always have cream for our porridge and desserts. Part of the skim milk we heat for the coffee, using two-thirds milk and one-third coffee, and always have plenty for cooking purposes.

Cream is generally considered the most important part of milk, while little value is given to skim milk. What is cream? Its principal constituent is fat, a valuable heat producer, and one which will store up fat in the body, but cream is deficient in the essentials for vital purposes, and the general up-building and repair of the body. Skim milk is rich in these compounds and, strange as it may seem, will sustain life better than cream. A healthy child would starve if fed only on cream. I would not for the world say one disparaging word regarding cream. Who does not like good cream? The fat globules in it are so infinitely small that they are very readily assimilated, making cream one of the pleasantest and best ways of taking fat. Would we all could get more of it!

Skim milk should be more largely used not only as a drink, but also in the preparation of soups, bread, pies, etc. I saw in an old number of *Hoard's Dairyman,* "If the Government, instead of sending missionaries to Europe to teach the value of corn for human food would spend an equal amount of money in teaching how to use the despised skim milk and the value of it as food for humanity instead of hogs, there would be more profit to the dairymen and the consumer as well. But corn is golden and appeals to the imagination while skim milk is thin and cannot be handled on the board of trade. There is money in it all the same."

Exactly why skim milk should be regarded with so little appreciation is difficult to say, except, perhaps, because it is liquid. If we had the same amount of nutriment and water held in a solid form by cellulose, there is no doubt it would bring a good market price, but the average consumer does not distinguish between solid and liquid food, and consequently milk is passed by for something not more nutritious, but more solid. Two quarts and a half of skim milk have as much food value as a pound of round steak and more than a quart of oysters. A report of the British Farmers' Association shows that skim milk is a valuable addition in bread making and materially increases the yield, and consequently the profits, besides adding to its nutritive value.

Buttermilk is a beverage of deserving and growing popularity. It is rich in protein and is very easily digested, owing to the casein being in a finely flocculent condition. Doctors are prescribing a free use of buttermilk as a corrective for many forms of disease. The lactic acid germ is said to be antagonistic to the death germ; consequently people who use freely sour milk or buttermilk may reasonably hope to lengthen their lives. Sour milk or buttermilk should not be wasted, but used for pancakes, corn bread, etc.

People seldom realize the important part fat plays in the economy of the body. It furnishes that which largely produces heat and energy and stores fat in the body. We have little idea just how much fat we do eat, it is so often concealed in eggs, milk, cakes, pastry and cereals.

All fats contain three principal fats: olein, palmatin and stearin. The chief difference between these fats is that they melt at different temperatures. Olein is a liquid fat. Usually each fat has some distinct flavor and smell due to volatile oils. Butyrin is the characteristic fat in butter, and when it changes through age, or other unfavorable conditions to butyric acid, it causes that rancid taste and smell in butter.

Practically, fats are very much alike and all serve the same purpose in the body. Some, owing to the presence of more olein in them, break up more readily, and are more quickly absorbed into the system. Butter is especially valuable in this respect, and its pleasing flavor induces us to eat freely of it. Our only regret is that a fat so wholesome and delightful to the palate should be so expensive. Good bread spread liberally with good butter makes a complete diet, and is a combination of which we never tire. Were I a consumptive, instead of taking the disagreeable cod liver oil, I should take plenty of lightly-salted, fresh butter and trust to its doing me more good than the patent medicines.

Chemists tell us that cheese is one of the cheapest of foods as its nutritive value is much greater than that of meat and its cost about the same. It is not only valuable on account of the large per cent. of proteids and fats it contains but because of its flavor and aroma. Physiologists say we could not exist on foods devoid of flavor. At the same time, flavors are not counted as food stuffs, but they unquestionably play a most important part in our diet. In our country, cheese is considered a luxury rather than a staple food. Yet one pound of cheese is equal in food value to more than two pounds of meat, and it is much more evenly balanced in fats and proteids. The poor man should look upon cheese as a blessing and should use it much more freely. Throughout Europe generally the economic value of cheese appears to be quite fully understood and appreciated. In Switzerland it ranks second only to bread — skim milk, cheese and bread forming the chief diet of the peasants. So it is the case in Germany, and my own observation when in England showed me what quantities of cheese were consumed there.

In our country the idea seems to have become fixed that cheese is hard to digest. Personally speaking, I find I can often eat bread and cheese when afraid to eat anything else. Dr. Rubner, a German scientist, experimented with himself and found he could not consume much cheese when taken alone, but with milk he could take nearly half a pound a day, and it was only when he ate more than a pound a day, that it was less completely digested than meat. In moderate amounts cheese is claimed to be just as digestible as meat and eggs. It certainly is a cheap, easy and convenient way of getting part of the required six or seven ounces of proteid necessary for the body each day. The harm resulting from eating cheese is that it is often injudiciously partaken of and frequently eaten before the ripening process has sufficiently broken down the indigestible casein or curdy matter.

There are many different kinds of cheese on the market. All have some special characteristic and all have their devotees. The fancy makes are expensive, and from the point of food value not any more nutritious than a good Cheddar, the kind commonly made in this country.

Laws Governing the Potato

By EDWARD VAN ALSTYNE, Farmers' Institute Conductor

No one can lay down a set of rules which another may follow to the letter, and thereby insure a crop of potatoes or of anything else, for there is always to be taken into account differences in soils, as well as climatic and weather conditions, which prevent any hard and fast adherence to another's methods. Nevertheless, there are with the potato crop, as with every other, certain fixed laws which always obtain, and he who works in harmony with them, rather than from custom or tradition, works with nature, and is more likely to succeed.

Therefore, in calling attention to some of the principal laws which govern the potato — laws which are the same everywhere — I aim rather to help someone to secure a crop with a greater degree of certainty, than to give my methods, which, apart from the underlying principle, may be of little value.

First, then, let us look at the construction of the tuber. It is made up, in round numbers, of 75 per cent. water and 25 per cent. starch. The water without which in sufficient quantities, and at the right time, it is impossible to obtain a maximum crop, must, of course, come from the soil. The starch is formed by the action of the sunlight through the green leaf. Whatever, then, tends to promote a vigorous growth, and maintain and preserve the leaf surface at its best throughout the entire period of the plant's life, will insure the development of the greatest amount of starch, without which no potato can attain full size or highest quality.

How shall we secure the requisite water supply? If we could control the rainfall, the problem would be an easy one. Unfortunately — or fortunately — in nine years out of ten there is not enough rainfall during the growing season, from May to October, to produce a full crop of anything, much less a crop like the potato, which is three-quarters water. When one realizes that it requires more than 300 pounds of water to produce 1 pound of dry matter in a plant and considers the tonnage from even a moderate crop of potatoes, and then compares this with the average rainfall in his locality during the above-mentioned period, he will appreciate the truth of this statement. We must, then, secure a water supply from that in the ground in early spring, derived from melting snows and spring rains, at a time when there is little evaporation from the soil. This can be done in two ways:

(1) By preventing evaporation by frequent stirring of the surface soil. As fast as the ground is plowed in the spring, it should be harrowed — not left until the whole field is turned over. This will make the soil compact, and prevent loss of water by drying winds, and the breaking up of the capillary cells which quickly form when the ground is crusted, thus making the spaces so large that the water cannot climb to the surface and escape. If the weather is very dry, it is better to roll as fast as plowed, and then stir the surface. If the land has been fall plowed and one does not intend to replow, as soon as the land will bear a pair of horses and a light harrow, stir the surface. This will not only stop evaporation, but as the air strikes the soil the water will drop down, to be drawn up later when it is needed. Just as in a test tube, the water will not run out so long as one keeps his finger tightly over the top, but remove the fingers and let the air in, and at once the water drops down. The same principle of frequent stirring during the cultivation of the crop, until the tops cover and shade the ground, will do more to conserve moisture and insure a crop in a dry season than any other one thing.

(2) Plenty of vegetable matter in the soil will help to hold moisture. To illustrate, if we put an equal amount of water in two vessels, but place in one a sponge, and leave them both exposed to the sun and air, we know that from the one containing the sponge we can obtain water long after the other is dry. The vegetable matter has the same effect in the soil. I cannot, in the brief time at my disposal, describe and emphasize the question of soil humus as I should like to, but it is most vital to this crop. That is one reason that I prefer a clover sod for potatoes. I know many prefer "old ground." I am sure this is because the sod is turned in such a way as to leave the soil open, and the sod does not decay. If it is turned on edge with a narrow lap furrow and then com-

pacted, it will decay very fast and be mixed with the soil where it will hold water. Better still, if the sod is thoroughly broken up with a cutaway before it is plowed, the vegetable matter will be incorporated in the soil, and at once decay and feed the plant, and less fitting will be required after plowing. It naturally follows, then, from the above that the ideal soil for potatoes is a loamy one, not so hard or compact that the water cannot readily move through it.

The Seed

We are accustomed to speak of a "seed potato." Really, there is no such thing for a potato is a tuber, and whatever seed there may be is in the ball on tap. When we plant a true seed of grain, for example, although it may come from a weak parent, the pollen from the stronger plants surrounding it overcomes, to a degree at least, the inherent weakness. Hence, such seed selected from the pile by its appearance usually will not deteriorate, but will often improve on the same farm from year to year. Not so with the potato tuber or cutting. If one from a weak hill, with only one or two potatoes, or one in which all the tubers were small, is planted, there must be a deterioration, for there is no cross pollenization from a strong plant to help it. This explains why varieties of potatoes run out, and why people are continually seeking new-strung seed. There are thousands of dollars expended every year for potatoes to plant, many of which come from diseased stock, and few of which are selected, except by external appearance. Most of this money might be saved if the seed tubers were selected from the most vigorous productive hills, not so difficult a task as might at first glance appear, for one can plant a small portion of a field expressly for this purpose, and by digging the potatoes by hand can throw out all hills not coming up to the desired standard. I know two men, in widely separate parts of this state, who had a few years ago — and, for aught I know to the contrary, have now — the Early Rose as productive as when it was first introduced, and they have used only their own seed, potatoes being selected as above.

A small or medium-sized potato, if it comes from a vigorous productive hill, is a good seed, but the continued planting of small potatoes will mean deterioration, for an increasing number each year must come from hills in which the potatoes were all small. Anything which impairs the vitality of the seed means less vigor and productivity of the plant. Hence, if the tubers were blighted the previous year, it means that the disease is carried directly to the new crop. Of this I shall speak in particular in treating of blight. Again, a field in which the tops were destroyed by blight is one in which, because of the destruction of the leaf, the normal amount of starch has not been formed, and we have an imperfectly developed tuber. If the seed is kept where the sprouts grow long and are broken off there is a loss of vitality. For this reason I prefer to store the seed tubers in pits in the earth so covered with straw that they will not freeze, yet where they keep much cooler than in the ordinary cellar. The same covering will also keep the heat out for a long time in the spring. If one is planting late, after danger from the frost is past, the potatoes can be taken out and spread on a floor where it is light and cool. The eyes will then start slowly, and any potatoes which fail to sprout or which send out a thread-like shoot may be rejected, thus saving vacant oı worthless hills.

There is an increasing complaint of damage from scab. This is a bacterial disease, and never the work of insects. The infection may come from the soil. If so, there is no sure way of preventing the trouble. Professor Sirrene, of Riverhead, L. I., has had good results from 500 pounds of sulphur mixed with each ton of fertilizer — using a half ton of the fertilizer to the acre — applied in the drill. A sweet soil is most favorable to the growth of scab. For this reason lime should never be used on land just prior to a potato crop. Wood ashes which are rich in lime have the same effect. It will take at least 3 years for the scab to disappear from the soil, and in one badly infested, or strongly alkaline, much longer. I have found growers in the Ohio Valley using rye to be turned under before planting potatoes. This makes the land slightly acid and consequently less favorable for scab development.

A frequent source of infection is scabby seed, which can easily be controlled. The old remedy, and an excellent one, is to soak the seed — preferably before cutting — for at least an hour in a solution of 1 ounce of corrosive sublimate to 16 gallons of water, or 1 pint of formalin to a like amount of water. This will treat as much seed as it will cover, and may be used again and again. A convenient way is to place the tubers in a sack and suspend it in a barrel or tub of water. After the requisite time of soaking it can be raised up, and the solution will drain back on the vessel, and the potatoes be dry to handle. Both the above disinfectants are poison and should be handled with care. Where a large quantity of seed is to be treated, the above method takes a great deal of time. Professor Sirrene, quoted above, recommends as equally effective the following method: "For each 1,000 cubic feet of space, use 1½ pounds of permanganate of potash, and 3 pounds of 4 per cent. formalin. Arrange the potatoes in crates, baskets, or open side barrels, on each side of the cellar or bin, so as to leave a 4-foot alley between the tiers. Spread the permanganate of potash over the bottom of a large pan. Then pour the formalin over it and close the place tight for 24 hours. A gas is created which destroys all scab germs."

Much advice has been given as to how small a piece of potato to plant. No one can lay down any ironclad rule, but the underlying principle must be taken into account. From the standpoint of economy, one cannot ordinarily afford to plant whole potatoes, and cne too small to cut is too small to plant. The number of eyes in the seed piece depends on the type of potato, and the condition of the soil in which it is planted. Two strong eyes are enough, if they grow. The flesh about the eye sustains it until it can root and be sustained in the ground. A potato of the Early Rose type, with many eyes, will have less flesh about four or five eyes than one of the Rural type, with a few eyes, will have about one or two. Hence, the latter can be safely cut to a less number of eyes than the former. If the soil is moist and fertile, the roots will obtain a feeding place much sooner than if it is dry, hard and sterile. This, too, must determine the size and number of eyes.

DEPTH OF PLANTING

The potato requires coolness and moisture. If the planting is shallow it means, sooner or later, heat and dryness. Hence, rather deep planting, 4 or 5 inches, is to be rceommended, because it is according to the law of the plant. No one ever saw the tubers form much below the seed piece. Planted shallow, they must of necessity form near the surface. To prevent drying and burning, they must then be ridged up with earth taken from between the rows, cutting off many feeding roots, and leaving a cone-shaped hill which sheds water, and a depression which carries the rainfall to the lowest part of the field, where it is least needed. When planted deep, the tubers have a chance to form in the more moist soil, little ridging is necessary, and the summer rain penetrates to the roots about each plant. Those who plant early will contend that potatoes planted deep will be longer coming up, and the crop will not be as good as if they were planted more shallow and afterward ridged. This is true, yet the principle obtains. Early in the season the ground is cold and has an overabundance of water. If planted and covered deep, it will take a long time for the sun to penetrate to the tuber. Hence, they sometimes fail to come up at all, or are too late for the highest price. If, instead of covering deeply all at once, just enough of the warm surface earth is put on to keep them from chilling, the sun will warm and start the eyes. After a few days put on, with a harrow, a little more earth, which has also become warm, and repeat the process until the ground is level, when the potatoes will come up quickly, and be strong. At the same time one has cheaply stirred the ground, retaining the moisture, and destroying countless weeds just as they were sprouting.

Except in very foul ground, on which it will seldom pay to plant potatoes, the best yields are obtained from drill, rather than from check row planting. More hills can be put on an acre, and there is less disturbance of the roots by late cultivation when this is done only one way.

FERTILIZERS

How much fertilizer and what kind to use, depends largely on the soil. If one has a clover sod, that will help to supply nitrogen, and the decaying vegetable matter will emit acids which help to liberate mineral plant food. In this case it will not be necessary to supply so much commercial fertilizer, particularly nitrogen. It is important to remember that nitrogen in organic matter, such as the decaying sod, manure, tankage, fish scrap or the like, will not become available until the ground is warm. Hence, for early potatoes, or where one depends in part on the sod, I would use nitrogen in the form of nitrate of soda. This is available at once, and for every 100 pounds of nitrogen applied, the plant can use 63 pounds, while from organic sources, not more than 41 pounds in each 100 pounds applied. For this reason I believe it economy, when nitrogen must be purchased for later growth, to use nitrate of soda,. making a second application just before it is needed. If a large amount is applied at one time, early in the season, much may be lost through leaching before the plants can use it. The danger of such loss will be reduced in soil full of humus.

When manure is made on the farm and is applied to a sod in the late fall or early winter, so that it is broken up by the frost and rains, there is little damage from rot or disease which may occur with manure applied just before planting. This will usually supply all the nitrogen needed, and all that need be purchased is phosphoric acid and potash. I have had excellent result from 1,800 pounds of South Carolina rock and 200 pounds of muriate of potash. This will analyze about 12 per cent. of phosphoric acid and 5 per cent. of potash. We hear much of the need of a large amount of the last named for potatoes, and many potato fertilizers contain as high as 12 per cent. For muck soils and those deficient in minerals this is doubtless none too much, but for most New York soils which are high in potash, all the evidence goes to show that from 4 per cent. to 5 per cent. is ample. In a few cases larger amounts have given better yields, but when the cost of the extra amount was figured out the increase did not pay for the extra outlay. All recent experiments show that phosphoric acid is a controlling factor. Of this there should be a surplus which will not be lost, but is available for subsequent crops. In a dry time the soluble phosphoric acid tends to revert or lock up. When rain is lacking until late in the season, which will make the plant food again available, if there is a minimum of this food not enough will become available in the short time in which it is needed.

A very good potato fertilizer for ordinary soils, when one applies all three at planting time, can be made from 400 pounds of nitrate of soda, 200 pounds high grade tankage, 1,200 pounds of

South Carolina rock and 200 pounds of muriate of potash. This will analyze 3.7 per cent. nitrogen, 9.4 per cent. phosphoric acid and 5 per cent. of potash, and, if the chemicals are purchased, should cost not over $28, including mixing. I would pay no more for potash in the sulphate form for potatoes than for the muriate. In spite of the contention that chlorine in the latter will give the tubers a strong flavor, all tests fail to show any difference, even when an excessive quantity is used. The amount of fertilizer per acre will depend on the condition of the soil, usually not less than 500 pounds in combination with manure, or on very fertile soil, or with a clover sod. When these are lacking, 1,000 pounds seems to be the most profitable amount. True, many use as high as 2,000 pounds and claim it pays. Professor Sirrene has made exhaustive tests on Long Island soils, extending over a period of years, with the following result:

Fertilizer	Cost	Increased yield per acre	Money gain
500 lbs	$ 6.25	23.3 bus.	$ 5.40
1000 "	12.50	44.3 "	10.60
1500 "	18.75	55.4 "	8.97
2000 "	25.00	61.4 "	5.70

My own practice has been, when using only 500 pounds, to apply it all in the drill; with a larger quantity, the balance broadcast, because the feeding roots extend all through the soil. This seems logical. Further, if a large amount is put close to the seed, and heavy rains follow planting, there is often injury to the seed. Hence, it is always wise to mix the fertilizer with the earth.

PRESERVATION OF THE GREEN LEAF

Anything which destroys the leaf surface reduces the starch making machinery, and though there may be abundant water supply, ample available plant food of the right sort, and greatest vigor of plants, if the leaf surface is impaired or destroyed, all will be for naught.

INSECTS

In many sections the flea beetle is very destructive; but where Bordeaux is used the damage has been very slight. Not that it kills the beetles, but being very distasteful, it drives them away, perhaps to feed on something less valuable, or it may be they starve.

Like the poor, the Colorado potato beetle is ever with us, and, although there is an occasional year when they do little injury, the following year is likely to see them abundant. If left unmolested, they will often, in forty-eight hours or less, so defoliate the plants as to reduce the yield below the point of profit. This emphasizes the importance of putting the poison on in time. Often a very little, just as the old hard shells appear, before they deposit their eggs, will prevent further injury. The old stand-by has been, and in many places still is, Paris green. This has many objectionable features. First, the arsenic is insoluble and the foliage is burned by it. I am sure we have suffered more than we have realized from this. Professor Jones, of the Vermont Experiment Station, once told me, that 50 per cent. of the potato leaves sent to him for examination for blight had simply Paris green injury. Next, being in the form of an amorphous powder, it washes off quickly, and if applied before the bugs are well hatched out, the application must be repeated, materially increasing the cost. With these facts before us, I recommend arsenate of lead. This will not injure the foliage in any quantity. It is in a paste form and will adhere a long time. Hence, it can be put on with impunity when the bugs first appear, and it will remain for those hatching later. It is not so quick in its action as the green, and many who have tried it have complained that it did not kill the bugs. This was my own experience the first time I used it, waiting until the bugs were abundant and applying it with a sprayer which did not thoroughly cover the vines. Since I have learned to use it at the first appearance of the bugs, and apply it in such a way that every leaf is covered, I have found one application sufficient for the season.

Arsenate of lead is sold on a guaranteed analysis of the arsenic oxide it contains. Therefore, one can readily determine its commercial value, and also how much to use. If, for instance, 1 pound of Paris green — which should be 50 per cent. arsenic — to 50 gallons of water has been found sufficient to kill the bugs, one should use 3½ or 4 pounds of the lead to a like amount of water, or Bordeaux.

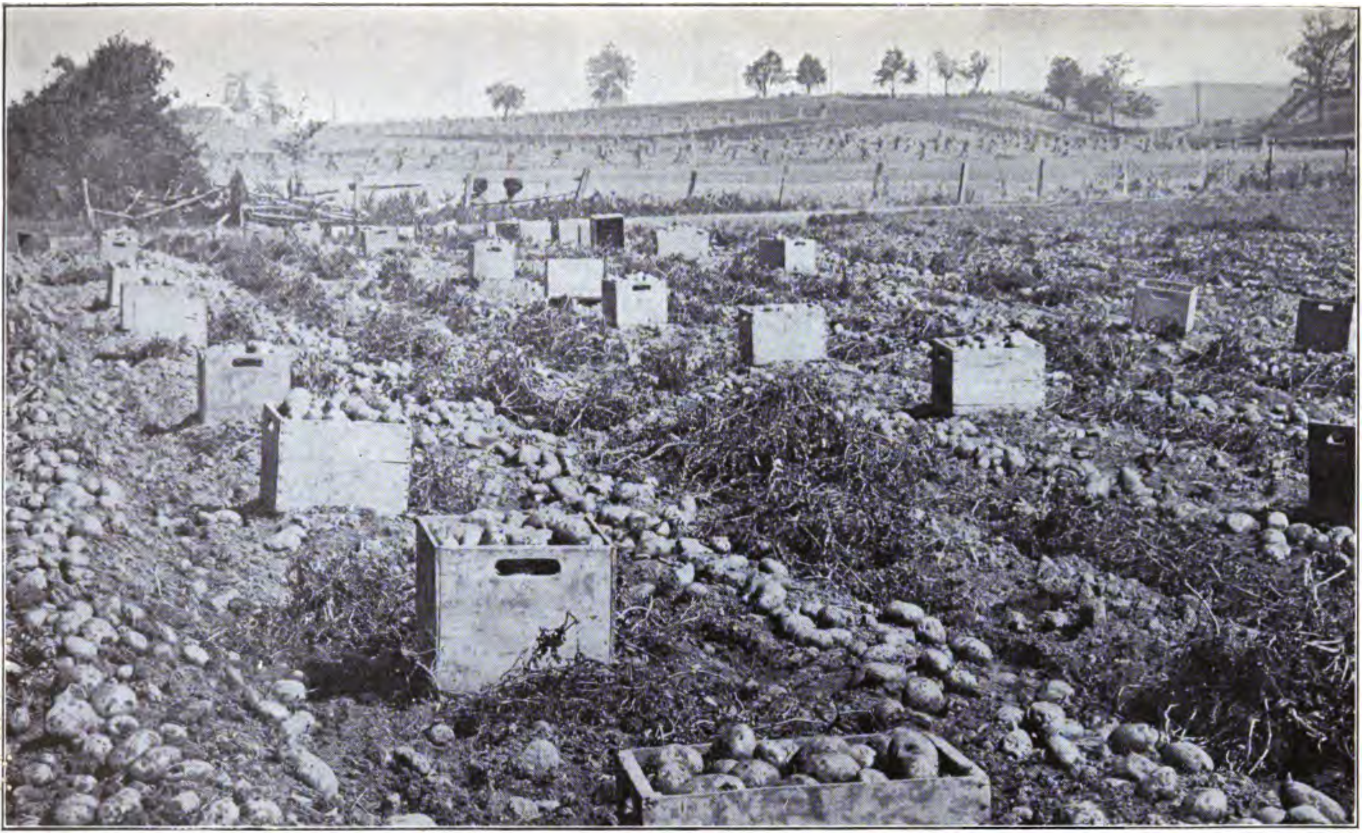


FIG. 9.—POTATO CROP IN NEW YORK STATE, YIELDING 255 BUSHELS PER ACRE ON 18 ACRES.
Spraying increased the yield 60 bushels per acre and cost $9.75 per acre, giving a net gain of $20 per acre.

DISEASES

A disease which does much injury is "tip burn," often mistaken for blight, but entirely different. The life history of this has not been thoroughly worked out. One theory, and to my mind a very plausible one, is that when the early part of the season is wet and the plants heavily fed with nitrogenous fertilizers, a rank, rather soft growth follows. Later in the season it turns dry. There is more plant than can well be supported, and the extremities of the leaf, farthest from the source of supply, and being only imperfectly nourished, are easily affected by the disease germ which the more vigorous parts of the plant resist. Bordeaux is a good remedy, but it must be evident, if the above is correct, that an abundant water supply and plant food are conditions which make this disease less likely to occur.

BLIGHT

Taken altogether, the most serious foe to the potato is the blight. It is so insidious in its attacks that if preventive measures are not employed early in the season it will often ruin a potato crop in twenty-four hours. The late blight is the one most in evidence and most destructive. It is peculiarly a wet weather disease, the spores of which, so far as is known, live over winter only in the old tubers. When such infested tubers are planted and the earth becomes warm and moist, these spores multiply and burst from their cells, so that the soil literally swarms with them. Many, of course, die; some find their way to the surface. Often, when the plants are five or six inches high, a heavy rain will beat them down to the earth, where they come in contact with the blight spores. If the weather continues wet, these multiply and penetrate the leaf. Later they spread to other leaves and live on the leaf tissues. When weather conditions are favorable, i. e., wet, they increase at an enormous rate, and so destructive are they that a field will often turn black in a day. If the wet is excessive, these spores are washed from the tops to the ground, and so to the tubers again, and rot often follows — always infection. Here is another reason for deep planting.

Tubers are less exposed to the spores and being deeper and cooler in the spring, fewer spores germinate and come to the surface. There is no cure after the spores are established, but it can be prevented by what is known as the Bordeaux mixture, viz., 6 pounds of copper sulphate (blue vitriol), 4 pounds of lime and 50 gallons of water. If this is thoroughly applied early, before the leaves are contaminated, it copperplates them, as it were, and the blight spores die because they can not gain an entrance. It must, therefore, be applied in season, thoroughly, so as to protect the whole plant, and often enough to cover the new growth. Sometimes one spraying before the spores come from the ground has been sufficient. Usually three give excellent returns. Again, five are even more profitable. Much depends on the season, as well as on the time and thoroughness of the work.

There is no question as to its practicability, in proof of which I call attention to Bulletin No. 323 of the New York State Experiment Station, which may be had for the asking. Briefly stated, the facts are these: For seven years the station has been carrying on cooperative experiments with farmers scattered from one end of the state to the other. The farmer does the work according to his own method, the station provides for proper check rows, and assists in measuring the areas and weighing the product. The grower keeps accurate account of all expenses and profits or loss from the spraying. During the seven years the average cost of spraying an acre has run from $4.15 to $5.90. The increased yield per acre has been from 18.5 bushels to 62.2 bushels and the net profit per acre from $8.53 to $24.86. This is the average highest and lowest return from all the experiments in different years. The greatest gain, of course, has been in years when blight was severe, the smallest being in 1908, when there was scarcely any blight. Doubtless, much of the gain that year was due to decreased damage from flea beetles because of Bordeaux applications. The average increase in yield per acre for the entire period was 44.1 bushels, with an average net profit of $16.77.

Few appreciate the fact that the potato makes its most rapid growth in the last two weeks of its life. If the green leaf, then, is impaired or destroyed before the plant has lived out its natural life, the yield may be so decreased as to do away with the profit altogether, or the increase by preserving it by spraying, after paying the expense, is clear gain.

RECAPITULATION

To briefly summarize and emphasize the foregoing, it is apparent:

(1) That humus well mixed with the soil, and frequent surface stirring of the same, will materially help to store up moisture or a water supply against the period of greatest need, when the tubers are forming and the tops are evaporating water most rapidly.

(2) That deep plowing and planting and non-hilling in ordinary dry seasons will all tend to the conservation of moisture.

(3) Strong, healthy seed, in well-tilled soil, with an abundance of available plant food of the proper kind, promotes a vigor of both top and tubers, which will resist disease much better than a weak plant.

And (4) to insure the greatest development of starch, the leaf surface must be preserved until the potato has completed its life cycle.

Surely, then, a line of procedure most in harmony with the laws of nature governing the potato plant will be most likely to insure a crop.

Suggestions from a Practical Experience in Fruit-Growing

By Thomas B. Wilson, Farmers' Institute Conductor

Originally horticulture was known as the science of growing all kinds of fruits, including tree, bush and vine fruits. Many of the growers are now specializing in these different branches, and the selection in specializing should be made with a knowledge of location, climatic and soil conditions. While the man behind the business is a very important element, failure may result if a careful consideration of these other conditions is neglected.

Now what I am to say will be principally on the subject of a single standard fruit, viz., apples.

I mean by location that you must not select a farm any great distance from a local market, as the item of hauling a large crop of fruit to market, especially apples, is a very important matter. Again, you do not want a location where the air drainage is not good; for instance, on low flat land where you are apt to encounter fungus conditions through foggy, damp weather.

The kind of soil and the texture of the subsoil are other points to be considered in selecting a location. Any soil that will grow good crops of the various kinds of grain, or vegetables, and will retain moisture well, and one that was originally covered with a beech and maple forest, is considered a good soil for the successful growing of apples. Where old apple trees bear almost regular crops of apples and where apple trees seem to grow naturally in the old fence-rows or in the open places in the woods, one may be fairly sure that a new orchard will grow.

Climatic conditions vary so much in different localities that it is difficult to recommend any set rule in making a selection for a fruit farm, and it might be said that air drainage is a climatic condition also, but it really belongs in the selection of a location. Generally speaking, and especially for some of the small fruits, near some body of water, such as the larger lakes, or the chain of lakes in central and western New York, or along or near a river, such as the Hudson, the air seems to be of a more even temperature, and therefore the bad effects of either late or early frosts re avoided. Sometimes a location of this sort furnishes the means of protecting an entire crop of peaches, grapes, or even apples and pears.

The variation in soils, even in such locations, is so great that judgment should be used in selecting the proper soil for the different varieties of fruit, and, in the case of apples, for the different kinds of the same fruit as well. For instance, a Northern Spy needs a very different soil from the Baldwin, and the Wagener very different from either, so that in planting an orchard, I would select the lighter parts of the soil or field for the Spy or Wagener

In nearly all soils suitable for growing apples, one of the very necessary things in the preparation is to drain the ground thoroughly. You can plot the field so you know where each row of trees is to be set, and if the slope of the ground is gradual so that you can get a good outlet for your drains on one side, or on two sides of the field, you can run a drain between every other row of trees in the case of an apple orchard, but the drain must necessarily be closer for smaller fruits. This will bring each row of trees near enough to a drain so that no stagnant or dead water will injure the growth of the root system, and will also prevent a large percentage of the winter injury, of which we are seeing so much to-day.

After the plot is thoroughly underdrained, the field should be put in good condition for the proper planting of any grain crop, then staked out for planting, which can be varied according to different notions, provided the rows are straight whichever way you may look. This shows better general orderliness in the man than to plant them out of line. The best and most economical way that I have found to secure straight rows is to stake the plot all around the outside opposite to where you want the rows, and equal distances apart, close to the fence. Then set a row of stakes — common laths make good stakes — across the middle of the field each way, and set both the middle rows by sighting across the field from one outside stake to the one opposite. When it is staked carefully in this way, you can dig the holes and set the trees by sighting two ways from any position without moving or displacing a stake, using care not to look back over the row of trees and move the one you are setting to correspond with the row set. If you do this, you are sure to fall into an error, and then if an error of just a trifle is made, you are liable to double the error on the next tree you set. Use the stakes altogether in setting the trees. Then, if you make any mistake in setting a tree, you can go back to your original line in setting the next tree. A little error of an inch will not be noticed when the trees are six inches in diameter.

One of the great mistakes in setting an orchard in the past has been in setting the trees too close together. Do not set them closer than 40 feet each way. A great deal of the fruit, leaf and tree injury by fungus is caused by thick setting which prevents the free circulation of the air and destroys the root system. Many of the growers believe that by trimming off the lower limbs from one-half of the trees they can obviate all the difficulty of thick planting, for a few years at least. This is a mistake. They do not realize that the roots interlap much more than over the tops, and that, when one-half the top is cut off from every other row, those trees make an extra effort to assist nature in replacing the wood cut out, thus robbing the remaining trees of a part of their sustenance. A better remedy is to cut down one-half the trees, removing every other diagonal row, thereby letting in the sunlight and air, which prevent fungus and give better size and color to the fruit.

In buying your trees, go to some reliable nursery firm, as near home as possible, and buy Number One trees, two years old. Have them taken up about the time you wish to plant, either in the spring or fall, whichever is the most convenient. Keep them from the sun as much as possible. Select either Northern Spy, Northwestern Greening, Stark, Tallman Sweet, or Russet, all of which are strong, straight growers, and have a better root system than most of the other varieties. They are also more free from cellar rot and canker. Do not buy any fruit trees of agents who are strangers to you. They are the fellows who buy up cull stock and canvass among strangers to sell it.

In the fall, after the trees are set, select some good man either to bud or whip-graft these trees into the varieties you wish to grow, and, in selecting varieties, do not deviate much from the old, established, standard varieties which seem to do the best in your locality. In selecting buds or grafts for such varieties, select them from trees you know to produce well-formed, well-colored, long-keeping types. In some varieties of apples, there are several types of the same apple, and in top-working, you can select your choice from these different types. Put in about three buds, in case you bud, and when the buds are started the next spring, cut out all but one bud. Form your entire top from that one bud, using great care that the bud moth does not destroy the buds about the time they start in the spring. Go over every tree carefully about three times each week and kill these.

In setting the buds, set one row of one kind of apple, the next row, of another; if you plant three kinds, set the third row of another kind, and so on. In this way, you will get the benefit of cross-fertilization. I believe that many of our varieties do not self-fertilize, especially some years when weather conditions are not favorable at the time the trees are in bloom. Otherwise there are no disadvantages in setting in this way, and when the trees begin to fruit, I think there is another advantage to the large grower. He can divide his men into two or three gangs, putting one gang on one row and another on another row of the same variety of apple. The two gangs are in this way separated by one or two rows, so they cannot readily shift from one gang to another. The foreman can then know, when each day's work is done, just what each lot of men has picked. Men usually have enough pride to keep about even with their next-door neighbors, and each gang keeps a little watch out that the other gangs do not pick more barrels or crates than the men of their own gang. In this way, I believe it is a benefit to have the rows of the same variety of apple separated by at least one row of another variety that ripens either earlier or later.

It is my practice to crop the young orchard for ten or twelve years with some cultivated crop, in that way securing a large tree as soon as possible, and to plow and cultivate thereafter only enough to secure a sufficient growth to keep the trees in a healthy condition. Too much cultivation, on some soils, induces excessive growth, and will not produce fruit buds. In some of our lighter soils, however, it is better to keep the soil well cultivated until July or August, then sow some cover crop to protect the root system in the winter, and also to draw the moisture from the ground, in that way assisting the young growth to ripen its wood more thoroughly.

In the cultivation of the young orchard through a series of years, great care must be taken not to injure the bark by driving too close to the trees, remembering that you are growing the trees for a long term of years, and several cultivations each year open many chances for injury. In raising a corn crop, it does not matter so much if you occasionally injure a stalk; all of it will be cut that fall, and you will begin over again the next year with all new stalks. Not so, however, with a fruit tree, for if you injure a tree every time you work in an orchard for ten or twelve years, you will have no trees by the time they come in bearing. If, by accident, you do peel some bark from a young tree, see to it that it is covered with grafting-wax. Cloth torn in strips and saturated with grafting-wax makes a good and convenient wrap. Be sure to apply the grafting-wax before the wound dries at all.

In trimming to form young trees, never leave more than three or four limbs that are to be the lower limbs of the tree, and never prune severely. Trim with care. Make a study of older trees, and trim the young ones so the limbs will not be too thick.

Pruning and Care of the Orchard

By Fred E. Gott, Farmers' Institute Conductor

A good apple orchard is a valuable adjunct to any farm. It is profitable where even indifferent care is given, and where the best modern methods of treatment are adopted the returns each year are often greater than the value of the land itself would be for any other purpose. There are many neglected orchards which might readily be made very productive if the owners would apply better treatment. The fault with most old orchards is that the trees were planted too close together; 32 feet apart was formerly the rule from which no deviation was believed possible. In such cases, the removal of every second diagonal row may seem like heroic treatment, yet is quite essential in order to obtain the best results.

Judicious pruning of the remaining trees is the next thing to be considered. I believe that more orchards have been ruined by over-pruning than by complete neglect in this particular. It is very unwise to remove too much live wood from a tree at one operation. Many farmers have entirely neglected the shaping of their trees until they have become like a brush heap, and then have suddenly awakened to the fact that something ought to be done. Fearing to undertake the work themselves, they employ the first man who will undertake the job, usually by the day, and as an incentive to thorough work agree to give him all the wood he cuts from the trees. The man is generally well paid for a few weeks' work, gets his summer fire wood and, incidentally, ruins the orchard. It is an exceedingly difficult matter to instruct some men in the art of pruning, a gift which few possess.

Many varieties have their own particular habits of growth and the first requisite of proper pruning should be to maintain, so far as possible, the natural symmetry of the variety to which the tree belongs. You can not make a Greening tree grow like a Northern Spy or Sutton.

A few general rules may be safely given. Remove all dead limbs and stubs, as they are a menace to the health and life of the tree. Cut each limb close to its origin and under no circumstances leave a stub. It will never heal, but when a limb is cut off close, nature will in a short time form a covering of new bark over the wound. When limbs of three inches or more must be removed, paint the wound with any kind of cheap paint, in order to protect the wood from decay until the healing process is complete. After removing all dead wood, next remove all limbs which cross each other or grow in fantastic shapes and directions. These latter we call "sports" and they sometimes grow straight up through the tree to a height of many feet, whereas they ought to grow laterally. After having removed these, be careful not to remove any more of the live wood in any one season than is absolutely necessary to let the sun and air into the tree. Thin out here and there where the branches seem too thick. It is better to take two or three years to finish the operation in many cases. The removal of too much live wood in one season tends towards the growth of more wood, which is usually at the expense of the bearing habit. All things considered, the best time to prune is in late winter or early spring. However, wounds made when the wood is frozen do not heal as rapidly as they otherwise would.

The tools used are the saw, preferably one with a steel frame like a meat saw, a thin blade and fine teeth. These saws make a clean cut and are rapid in operation. A pole pruner is often of great help in cutting out small branches or dead twigs from the extremities of the limbs, but will not make as close a cut as the saw.

Suckers should be removed, except in the case of overpruned or broken trees when it may be desirable to allow a few to grow so as to fill vacant spaces, although this is not always satisfactory. In training a newly set tree it is advisable to start the main supporting limbs from different heights on the trunk. This will make a stronger tree and one less liable to split than where the main limbs are allowed to start close together.

The cultural system is the method most in vogue in the best western New York orchards, and where this system can be adopted it is certainly the proper treatment. Experiments have proved this fact conclusively. This system consists in an early working of the soil with the plow or cutaway, followed by frequent and thorough harrowing up to July 20 in this latitude, then seeding to a cover crop. The growth of wood at the extremities of the branches should indicate very closely what the cover crop should be. If the growth is one foot or less a legume should be used, and I find nothing better than Mammoth clover. Where the growth of new wood exceeds twelve inches, it would seem wise to go slow on legumes and use instead buckwheat, rye, oats, rape and cow horn turnips. Where cover crops are worked into the soil each year, very little attention need be given to the question of fertilizers. In a neglected orchard, where an impoverished condition of soil exists, stable manure applied during the winter and a liberal application of dissolved South Carolina rock and potash, first before plowing, has often given good results. Ashes or lime generally benefit it by increasing the growth of the cover crop, thus increasing the amount of organic matter to be turned under.

Every up-to-date orchardist sprays early, often and religiously. He sprays the dormant trees with lime and sulphur for scale. He sprays again with lime and sulphur, to which he adds arsenate of lead, just at the time the buds open for blister mite, bud moth, case bearers and scab. Again, when the leaves have nearly all fallen, he aims the nozzle at the trees and drenches them thoroughly with arsenate of lead dissolved in water or Bordeaux or lime-sulphur solution. The amount of poison should be 6 pounds to 100 gallons of the liquid, and if the commercial lime-sulphur is used at this time, it should not be stronger than 1 to 32. One or two subsequent sprayings are sometimes made and are usually profitable.

There is but one rule for the packing of fruit for market. It is an old rule; everybody has heard it. It is called the Golden Rule and there should be no exceptions to it. Whoever fails to observe this rule in the packing of his fruit will sooner or later come to grief, and those who carefully and conscientiously follow it will own automobiles.

Spraying Mixtures

By Charles M. Day, Farmers' Institute Lecturer

The question of spraying is a most important one to-day. Every fruit-grower realizes, or should realize, that if he is to make the industry a profitable investment, his orchard, be it large or small, must be sprayed.

Not alone the fruit-grower, but also the farmer interested in potato culture, has come now to realize that it is useless to grow potatoes when no attention is given to the potato bug and the blight, which causes annually a big loss to the farmers of our state. Spraying, then, is an absolute necessity if we hope to have our fruit free from insect pests, and our orchards free from the many pests infesting them, and our potato vines healthy each year.

I realize fully that there was a time when it did not seem so imperative, but that time has gone and it is now just as important for you who have only a small orchard as for the large grower. When you sell good fruit, well grown, free from all blemishes, it is a good advertisement for another year; but poor fruit no one wants.

Let us, then, consider this important question under separate heads. First, the poison sprays. The most common poison has undoubtedly been Paris green, but to-day many friut-growers are using arsenate of lead. I like it for four reasons: (1) It will stay in suspension longer than Paris green; (2) when once upon the foliage, it will not wash off; (3) it will not burn the foliage; (4) it holds its poisonous qualities longer when on the vines. This is used for all insects which eat the foliage of fruit trees, bushes, potato vines, etc. We use about 3½ pounds to 50 gallons of water. It is best to dissolve it in water before putting in the spray barrel. I may add, too, that it mixes with the Bordeaux mixture, which I will mention later, thus combining two sprayings into one.

The first spraying should be done, on apples and pears, for the codling moth just after the blossoms have fallen. Never spray a fruit tree when in blossom, for you will then kill the honey-bees which are such an important factor in disseminating pollen; also, there is a law against it. Best results are achieved when it is done as soon after they fall as possible, for then the fruit is turned up, making a receptacle for the poison. Very soon the young apple or pear swells and turns the calyx end down, when it is a difficult matter to do a good spraying.

Recently we have found it advisable to do another spraying for the codling moth when the apples are about the size of a walnut, thus decreasing very materially the loss from wormy fruit. This second spraying with arsenate of lead is also very advantageous in preserving the foliage, for at that time of the year the tree is very apt to be invested with insects which soon defoliate a tree if left alone. Surely, we all know how valuable a good, healthy foliage to a tree is, and yet we often see trees where the worms have made heavy inroads on the foliage.

For the potato bug it is the best poison I know of, and to those who have never used it on the vines I earnestly recommend it. At the first appearance of the bug make the first application, and again when the new foliage makes its appearance, at which time it may be combined with the Bordeaux mixture.

In using poison, care should always be taken to keep it away from all receptacles which are used for watering stock and from possible reach by the little ones of our households. We cannot emphasize this fact too strongly.

Currant and gooseberry bushes should be sprayed with poison at the first appearance of the currant worm which is generally most noticable on the edge and under side of the leaf. A second brood usually comes when the currants begin to ripen. We use Paris green for this spraying. Never hesitate in using it at this time for fear of poisoning some one who might eat the fruit later. There is no danger of this, but untold harm is done both the fruit and bush if the bush is defoliated at this time.

Next, let us consider the question of the control of fungous diseases. The spray most commonly used today for these diseases is known as the Bordeaux mixture. I feel sure there is scarcely a farmer or fruit-grower who is not familiar with the name, but I find many who have never used it. It is to those I wish to mention a few facts concerning it: how it is made, when to apply it and the results which may be expected from its use. Let us all remember that it is a preventive, not a curative measure. Therefore, we must begin early in its use if we expect to get results. I fear that the delay in the first application is the reason that better results are not achieved today. The mixture is composed of 4 pounds of copper sulphate (blue vitriol), 4 pounds of lime (unslaked), and 50 gallons of water. Suspend in a barrel an amount of the vitriol, in a phosphate sack, equal in pounds to the number of gallons of water in the barrel. Then, for every gallon of the water you will have a pound of vitriol. This is much easier than making up one application at a time. For one who has only a very small acreage to spray, it might be better to make it up as you need it. In a good sized box, slake a quantity of the lime. Never immerse it in water all at one time, but add the water as it is slaking. In this way you will get a much better material.. Keep it covered with water and it will last a long time. Put into a barrel, holding 10 or 15 gallons of water, 4 gallons of the dissolved vitriol; in another barrel, a quantity of the lime which will about equal the 4 pounds required in 15 or 20 gallons of water. Then, unite both of the materials in the barrels, stirring thoroughly, and you have the Bordeaux mixture.

Unless familiar with the color, it is safest to test with yellow prusiate of potash, which can be purchased at any drug store. To carry out the test, add a few drops to the mixture. If not enough lime, it will turn dark brown. If enough lime, it will not change color. An extra amount of lime will do no harm, but is often an advantage. It is a good plan to steam the lime before putting it in the barrel. Put the mixture in the spray barrel, fill it up with the required amount of water, and you are ready for the first spraying.

The first spraying with this mixture should be done as the buds are beginning to open; the second spraying, when the tree is fully in leaf. Some fruit-growers spray a third time after blossoms fall. The fruit-grower must be his own best judge about this third spraying. It is used as a preventive for apple scab, fungus of all kinds on apple trees, and on some varieties of pear and plum trees, and for the peach curl.

As a preventive of the potato blight, the first spraying should be done when the vines are about 6 inches high; the second, about two weeks after that, and the subsequent sprayings at intervals of about two weeks. There is need of at least three thorough sprayings. More will be better. In fact, many potato-growers to-day spray seven and nine times. You should all be familiar with the work that Professor Stewart, of the Geneva Experiment Station, is doing and has done in this line. If you who grow potatoes are not, send at once for his bulletins giving the results.

There is still another feature to the spraying. Even a year when there is comparatively little or no blight, the Bordeaux keeps the vines green so much longer, that it is profitable to use it. In spraying the vines, see to it that all the leaves are thoroughly wet. I speak of this as many are careful to wet only the top leaves. If you use a good nozzle, which throws a mist-like spray, driving slowly over the rows, this can easily be done.

We come now to the third class of sprays, viz., that for the control of sucking insects, such as the San José scale, and oyster shell bark louse. It is perfectly surprising to note what damage is done every year to the fruit interests of our state by negligence in combating these serious pests. Too much cannot be said of the work our Commissioner of Agriculture and his inspectors are doing to eradicate these pests, but they need our hearty coöperation.

Most of the inspectors' time is, of necessity, given up to the close examination of nursery stock. In this way alone can we hope to check these pests before infested stock is planted. However, if you fear your trees are infested, send a letter to the Commissioner of Agriculture, at Albany, stating your case, and in due time an inspector will be sent to examine your trees. If he finds the scale he will give explicit directions as to its treatment. I cannot too strongly urge upon you the necessity of prompt action if the scale is found. If you wish to save your trees you must do your part in this battle we are all waging. I can say for your encouragement that the scale can be controlled, as many fruit-growers all over our state will testify.

What, then, are the means used to combat this class of insects? As we can kill them only by covering them all over, thus shuting up their breathing pores, we use the contact spray for this purpose. There are two common sprays used to-day viz., the lime-sulphur wash (both the home made and the commercial wash), and the miscible oils, such as scaleside and killoscale. From the testimony given by fruit-growers, both seem to be effective. The lime-sulphur wash is composed of 15 pounds of flowers of sulphur and 20 pounds of lime to 50 gallons of water. Dissolve the flowers of sulphur in a pail before adding it to the mixture. Slake the lime in about 10 gallons of water, warm water being best for this. Then, dilute the lime to about 2 gallons, add the sulphur, and boil about 45 minutes, or until the liquid has attained an amber color, something the shade of brick. This mixture should be strained when put into the spray barrel. Then, fill it up with water and you are ready for business. It is better to use this spray as soon after it is made as possible, for it has a tendency to crystalize upon cooling, when it is of little value as an insecticide.

This lime-sulphur solution must be applied in early spring, before growth starts, or before the buds have opened to any great extent. Where the scale is very abundant an application in the late fall will help very materially in killing what have developed during the summer. When once under control, this fall spraying may not always be necessary.

Now in regard to its use. Unless a fruit-grower has had the scale and has successfully fought it, he does not know what real spraying is. Always spray with the wind, covering the windward side from top to bottom. Every spot must be reached. When the wind changes, return to the sprayed trees and spray the other side thoroughly. I find it very important to go over them the third time to do a little patch work, which is quickly done and very essential. So that when you have finally finished, *every spot has been covered.* Then and *not till then* can you hope to hold the scale in check.

In an orchard of any size at all, one needs a good power sprayer. It is impossible to reach the top of the trees without it. Also, you get so much finer a spray that it penetrates all parts of the tree, thus aiding you in your work. You need to maintain, at least, 100 pounds pressure, and two nozzles on each pole. The very best hose you can buy is much cheaper in the end. After purchasing your engine, become familiar with its construction, how it works, why it works, and if later, just when you need it most, it refuses to go, as sometimes a gasoline engine does, you will be in a position to know the reason for it, and can probably soon remedy the defect. We have several firms in our state to-day who are making good outfits which give their owners very little trouble.

In the potato field, too, a power sprayer is very advantageous. It seems to drive the spray somewhat into the foliage where, coming with such force, it strikes not alone the top of the leaf but also the under side. It is very essential, in using the Bordeaux for the prevention of the blight, to wet the under side of the leaf.

Those of you who feel that the lime-sulphur solution is too much trouble to make, can procure the commercial wash from the several different brands manufactured. It is more expensive but does good, effective work. Most of the commercial brands should be diluted 1 to 11. The man who makes his own solution often finds it very convenient to have on hand some of the commercial wash.

Not alone is the lime-sulphur solution good as an insecticide, but, I believe, we will soon come to use it as a fungicide in the form of a summer spray. Astonishing results have already been achieved in this way, but as yet I can give no definite information about it, having never used it in this connection. I like it better than the miscible oils, because it is such a good fungicide, and I feel sure the oils have very little fungicidal qualities, if any. Moreover, they are much more expensive.

It is true new pests are coming all the time, requiring new methods of treatment. However, we have our two experiment stations to help us in all these troubles and they never fail us. What, then, will be the outcome of it all? Will it pay us, as fruit-growers, to continue spraying? I answer that it certainly will. We surely must become very familiar with all the sprays, when to use them, which ones to use, and how to prepare them for use, for only in that way can we do good, thorough, effective work. The increase in price for good, clean fruit, and the fact that our trees are healthy and growing each year will much more than recompense us for all our trouble in spraying and we will have the satisfaction of knowing that "we have met the enemy and they are ours."

The Farmer's Garden

By John Jeannin, Jr., Farmers' Institute Lecturer

The American farmer of to-day is seeking new methods and things that will enable him to increase his farm crops or to lessen the cost of production. He generally ignores, however, the fact that it is not always an increase of income that brings to himself and family added comforts.

The one thing most neglected about the farm and, possibly, the one thing that is the greatest source of pleasure, as well as profit, is the garden. It is a deplorable fact that the average farmer does not furnish his table with as good a variety of food as the laborer or mechanic. Is it to be wondered at that the boys and girls are better satisfied with city life with its bountiful table and endless variety?

A very common excuse is that a farmer can buy his vegetables much cheaper than he can grow them, and the result of such an excuse is that his family does without, or a meager supply is purchased at the grocery in the form of canned goods. The humblest peasant of Europe considers the garden his greatest source of income. It enables him to support his family on the low wages usually paid to farm laborers, and, judging from the healthy appearance of the thousands of immigrants to our country, their health is not impaired by their vegetable diet.

The abominable inclosure so frequently found on our American farms is a disgrace to the profession, and to the foreign visitor denotes a lack of thrift and right living. There is no reason that the American farmer should not be the best fed man on the globe. With the literature and cultural directions found in the leading seed catalogues one can hardly offer the excuse of not knowing how. There is scarcely a farmer without some ideal plot of ground for a good garden. Any soil that will yield a good crop of corn can be inclosed and fitted for vegetable growing, with a hotbed and cold-frames. The season can be advanced so that many sorts of tropical plants can be grown even in a cold climate.

Hotbed sash for a farmer's garden can be purchased from seedsmen and is usually 3 by 6 feet, two being enough. For heating material, fermenting horse manure with a liberal quantity of straw should be frequently forked over until the whole pile is warm, when a pile 8 feet square and 2 feet thick should be made in a sunny location, well protected from north and west winds. Then place a frame of boards on the pile, which should fit the sash closely, 20 inches high in the back and 10 inches on the lower side. Should the manure be slow to heat, a sprinkling of hot water will start fermentation. The sash should be raised to allow the excess moisture to pass off. When the temperature begins to recede, 4 inches of rich, fine soil should be placed inside the frame. In a few days, if given proper ventilation, the surface of the soil will be dry enough to sow the seed. The seed should be sown about eight weeks before the usual time for planting in the open ground.

After sowing the seed, care should be taken to give plenty of ventilation, especially on bright days. Mats should be provided for cold nights. The following is the list of seeds that can be sown in rows 4 inches apart: tomato, pepper, eggplant, lettuce, early cabbage, melon and cucumber. Lettuce and cabbage should be sown in alternate rows between the tomatoes, peppers and eggplant, and should be removed to cold-frames as soon as large enough to transplant. A frame similar to that used for the hotbed should be provided and covered with sash or oiled muslin. No manure is used for heating materials, the frame being placed on a bed of rich soil. For two days after transplanting, the plants in cold-frames should be shaded with bran sacks, and plenty of air should be given, as the hardening process can only be done by exposure to the open air.

Lettuce and cabbage should be transplanted 3 inches apart both ways and, if properly cared for, will be large enough to set in the garden as soon as the soil can be plowed, when the cold-frames can be set with tomatoes and eggplant, 4 inches apart each way and shaded as for the former crops. After the tomato plants are removed, the hotbed will have exhausted its heat, when it will be in good condition for sowing celery, to be transplanted, as the former crops, when the tomatoes are removed from the cold-frames. Cucumbers and melons can be sown in strawberry boxes filled with rich fibrous soil, and placed in the hotbed after the lettuce and cabbage plants have been removed to the cold-frame. When all danger from frost has passed, the boxes containing the melon and cucumber plants should be moved to the garden, and transplanted in well prepared hills, six feet apart, and the sides of the boxes so cut as to permit the removal of the soil without disturbing the plants. Thus, the season may be advanced two or three weeks.

The ideal garden is one that is longer one way, instead of square, and large enough to be worked with a horse. A soil that is nearest to sandy loam, with a southern exposure, is to be preferred. The rows are to be of sufficient distance apart to enable frequent cultivating and plenty of sunshine for the plants growing therein. With some forethought as to the season of maturity of the different varieties of vegetables, a second and sometimes a third crop can be grown on the same ground.

In the selection of seeds one must be guided by the wants and tastes of the family, but the following list may be of service in this section.

Peas — Thos. Laxton, Dwarf Champion, Champion of England.
Beans, Bush — Wardwell's, Kidney Wax, Refugee.
Beans, Pole — Kentucky Wonder, Golden Cluster Wax.
Corn — Mammoth White Cory, Shaker's Early, Stowell's Evergreen.
Beets — Eclipse, Long Blood.
Squash — Yellow Crookneck, Boston Marrow, Hubbard.
Spinach — Thick Leaf.
Cucumber — Early Cluster, White Spine, Long Green.
Onions — Sets, Yellow Globe, Danvers.
Celery — Golden Self Blanching, Crawford's Half Dwarf.
Lettuce — Big Boston, Henderson's New York.
Tomato — Sparks' Earliana, New Corliss.
Pepper — Sweet Mountain.
Cabbage — Early Jersey Wakefield, Succession, Danish Ball Head.
Radish — Vick's Scarlet Globe, White Strasburg, China Winter Rose.
Musk Melon — Paul Rose, Netted Gem, Surprise.
Water Melons — Hungarian Honey, Seminole.
Parsnip — Guernsey.
Carrot — Danver's Stimp Rooted.
Cauliflower — Snowball.
Asparagus plants
Rhubarb roots.

No fertilizer has yet taken the place of well rotted-stable manure for the garden, which should be plowed under in the fall.

An application of a good grade of commercial fertilizer well harrowed in in the spring is very effective.

Planning the garden will be found very interesting work for the long winter evenings. Planning for winter canned vegetables, as well as for those for the table, in their season, is always in order and will be appreciated by the good housewife.

From an economical standpoint a good garden is a good investment. Some years ago the writer was curious to know the cost to the mechanic with a family of five persons for the supply of vegetables during the summer season, and he was surprised to find the amount to be $48. The head of the family was, therefore, obliged to labor for 24 days at $2 per day to pay for the vegetable bill, and yet he did not consider it was an extravagance.

It is very doubtful if the average farmer would be willing to expend a like amount for a like supply of vegetables for his family, and yet he can grow an equal amount of vegetables on less than one-sixth of an acre with much less than 24 days' labor.

There is oftentimes a spare half hour at noon, or after the day's work is done, that the horse and cultivator can be used in the garden to good advantage, without a loss of time. A farmer that plants the garden and depends on the women or the hired man on rainy days is too shiftless to ever accomplish much in making the home what it should be.

It would seem superfluous at this time to give cultural directions for the growing of the various vegetables when such directions are given in detail in the seed catalogues which can be had for the asking. A profitable addition to the vegetable garden would be a liberal supply of small fruits such as strawberries, raspberries, both red and black, besides currants and gooseberries which add so much to the variety.

It is to be hoped that in the near future the farmer's table will be abundantly supplied with all of the fruits and vegetables that are offered in such an attractive way in the stores of our cities. The farmer's home will then become the ideal home for the boys and girls who have to spend their youth on the farm, and the good wife can point with pride to the result of her skill in the art of preserving and canning. She may also have the satisfaction of knowing that her daughters are better equipped to make their homes what they should be — the best in the world.

Special Farm Crops

By A. B. Katkamier, Farmers' Institute Lecturer

The real value of land may be based not only upon the amount of its product under improved conditions, but upon the kind of product and its market value.

On every farm, large or small, there is some piece of ground on which some of the special or money crops can be grown with great profit. Of course, these special crops must be marketed to good advantage. There is loss if the available market is restricted and the crop is not all sold, or if there is so much of the product on the market as to force the price below the cost of production. But where the conditions of success are carefully considered by observing tendencies and possibilities of the tastes and desires of possible customers and markets, one can hardly go amiss in giving some attention to the special crops.

A special crop is somewhat difficult to define but may be considered a crop grown out of the regular farm practice or rotation of crops. Corn is considered a regular farm crop, yet I know of several men who are making it a special crop, that is, all the equipment and the soil are bent toward the production of first class corn and the financial results seem to be satisfactory. For a number of years T. E. Martin, formerly of West Rush, N. Y., made his farm grow great crops of potatoes by bending all his thought and energy toward this special crop, and financial independence was his reward.

It is, however, to the unusual crops that your attention is invited for a few minutes, and to their possibilities for bringing you some extra money.

In several instances I have grown special crops to meet conditions I thought were apparent, and the crops so grown have been my most profitable ones. It is true I took some chances, but there is an element of risk in growing even the staple crops. About the middle of June five years ago, I happened to read in a Rochester daily that the maggot was destroying the cabbage plants, that there was a greatly reduced acreage planted and that the mature crop would probably bring a high price. I reasoned from this that if I could grow a quantity of cabbage plants quickly, free from the maggot, and let the growers know I had the plants, I would be able to dispose of large numbers. The idea met with my wife's approval and I immediately sent a telegram to a seedsman for 10 pounds of Burpee's All-Head Early Cabbage seed to be forwarded C. O. D. Before this seed arrived I duplicated the order. This variety of cabbage can be set out very late, and with favorable weather will make large, crisp heads of superior quality. I then went to a piece of muck ground and made it mellow by thorough cultivation, and rich by broadcasting 1,000 pounds of high grade fertilizer to the acre. As soon as it arrived, the seed was sown with a Planet Junior hand drill. I then broadcasted 100 pounds of nitrate of soda to the acre. The muck soil was moist and warm and the seedling plants came up in 48 hours. I immediately began working between the rows with a hand cultivator to keep down all weeds and to areate the soil. When the plantlets were 2 inches high, I broadcasted another application of nitrate of soda just before a rain. I did everything I could to hasten the growth of the plants.

Twenty-one days from the time the seed was sown we began to pull plants large enough for setting out with a machine. I made the mistake, however, of sowing the seed too thick in the row and of getting the rows too close together. A greater distance would have made stockier plants. But I got plenty of plants. It seemed as though every seed grew. When we started pulling the plants, the helpers would average 5,000 plants each per day, pulled and counted. By close observation and thought I devised a method which doubled the output almost at once. I had each helper work with his back to the row and pull plants with both hands, counting silently as he pulled. When he had a bunch of 26 plants, he placed them at his right and pulled a handfull of muck over the roots. The plants were thus kept protected until they were packed in large crates. Ten days of this work filled all but a few small orders. In just a month's time we had grown and practically sold all the cabbage plants which could be grown on nearly two acres of ground.

I have sometimes told the exact returns from this special crop of plants, but the figures are so startling that some people refuse to believe them, so I refrain from stating them now. To the one who searches for them there often come opportunities for growing some special crop that will yield large returns for the land used and the labor expended.

From observation and experience, I am convinced that the special crop which gives the most universal assurance of success is the strawberry. In an article in a recent issue of the *Cornell Countryman* I made these statements:

"Start from any given point and go a distance of ten miles counting farms and gardens and not one in ten will have any cultivated strawberries growing. Then it is safe to say that not one in ten families will have all the strawberries they want to eat or would eat if they could have the berries just when they wanted them.

"Many men dismiss the subject by saying that they can buy all the strawberries wanted by their families cheaper than they could grow them. This statement may be seriously questioned. To have all the strawberries wanted is to have them just when you desire them and in such quantity and quality as the continued desire for them may demand. When you are depending on the market for your berries you are not always sure of a steady supply. You do without them occasionally or have less than you would use if the supply for the time being was not limited."

So long as these conditions exist there is room for more growers of the strawberry. Certainly, as a commercial proposition, the strawberry furnishes attractive features. It comes into bearing more quickly than any other berry or tree fruit. Plants set out the latter part of April or fore part of May will produce a full crop of fruit in June of the following year. The strawberry is the first fruit of the year to ripen, and comes at a time when the human system seems to demand the fresh fruit tonic which it furnishes. It pleases the eye with its bright color, the sense of smell with its fragrance and the palate with its delicious flavor. The strawberry will open the pocket-book of possible customers as no other fruit will. The essential things are to produce berries of good size, of bright color, of fair quality, have them decently picked into boxes of standard quart size, when you will find your market almost unlimited.

In choosing a field on which to grow strawberries, I select one which has been in hoed or cultivated crops at least one year, preferably two years. The larva of the June beetle usually infests sod ground. The white grubs are two years in the larva state and one year to a cultivated crop may not eradicate them. Two years is quite sure to.

Perhaps, the best crop to precede strawberries is the potato, as farmers usually consider this a money crop and make the soil rich in plant food and fill the ground with humus, either with barnyard manure or by plowing under clover or other sod. A portion of the fertility and much of the humus will be available for the succeeding crop. Humus seems to measure the plant growth value of soil, for it serves as a medium upon which the fertilizing salts may act, and also helps a soil to retain moisture Then the digging of the potatoes just before winter sets in puts the soil in a condition for the frost to further aid in breaking up all clods and lumps, giving the soil a splendid physical state by making it loose and mellow.

The space in a fine grained soil is divided up into an infinite number of small interstices, and as the rainfall moves down through such a soil much resistance is offered to its movement, a large quantity being held back for the use of the plant. This fining of the soil is highly important for the strawberry, for this vine requires vast quantities of water to make the new plants and enable them to store up plant food during August, September and October. If I think the ground on which I am to set strawberries is lacking in fertility, I prefer to use a high grade fertilizer, usually one analyzing 2 per cent. nitrogen, 8 per cent. phosphoric acid and 10 per cent. potash, using such quantity as I deem necessary, forming my judgment on the previous performance of the land.

Nearly every commercial planting of strawberries is made in the spring, the earlier the better. As soon as the soil will work without packing, start the plow. Then pulverize the surface soil very fine with the harrow. Mark the rows 3½ feet apart and set the plants 16 inches in the row, if they are slow growers like Bubach, or every 20 inches, if good plant makers like Parson's Beauty and Prolific. Never be satisfied with anything less than absolutely straight rows. You can cultivate so much more closely to the plants, thus saving considerable hand-hoeing. I get a straight guide mark by sticking upright a tall stake or long handled fork at one end of the first row. Then, going to the other end of the field, I sight by the stake to an object in the distance. By making a mark in the soft earth with the sole of my shoe as I walk along, keeping in line with the stake and distant guide object, I get a perfectly straight outside guide row. Then by being careful in using the marker, the rows can all be kept straight. The straight, uniform rows pay even for the good looks of the field. There is an aesthetic side to life as well as a practical.

Plants should be ordered early, preferably of a neighbor or near-by nurseryman who has the varieties you wish to set out. You will then be quite certain to have the plants ready at the proper time. A strawberry plant out of the earth is like a fish out of water; the sooner it is put back into its proper element the better. Nearly every grower has a different method of setting the plants. Some trim all roots to 4 inches, others do not trim them at all. I can't see that it makes any difference with the growth of the plant, whether the roots are trimmed or not. Do not expose the roots to the air or drying winds. When in the field keep them moist. I use a covered pail or basket.

I have used almost every conceivable implement to make a hole in the ground to take in the roots of the plant and I find it doesn't matter what tool is used, as the essential thing is to get the roots down into the ground and the soil pressed, not packed, firmly against the roots. In some of the mellow soils of Albany County the plants are set with the hands, no tool whatever being used. The crown of the plant, that part where the leaf, stem and roots join, should be even with the level of the ground. If the plant is set too low, the crown rots; if the plant is set too high, the roots dry out — either condition being fatal to the plant. If you are putting out varieties like Bubach or Haverland, which have imperfect blossoms, you should have at least every fourth row set to some variety having blossoms strong in pollen, such as Senator Dunlap or Parson's Beauty.

Many a grower succeeds in getting a fine stand of plants only to be sadly disappointed at fruiting time by having a crop of "nubbins" or "knots," because the blossoms had not been thoroughly fertilized. I believe that in future years more attention will be given to the staminate or perfect flowering varieties, cutting out and discarding the imperfect flowering or sterile varieties. Then the great losses occasioned by inadequate fertilization of the blossoms will not occur. As soon as the plants are set I start the cultivator, the outside teeth of which are very narrow — the inch width is best. You can then go very close to the plants without covering them up. In this manner you can almost hoe the plants with the cultivator, especially if you have kept your rows straight. I aim to get over the strawberry field every week with the cultivator. By doing this you kill the weeds before they appear above the ground. A very slight disturbance will kill them then, while if you wait until they have grown an inch or more above the ground you have difficulty in eradicating them, and will have to resort to considerable hand-hoeing and pulling.

When the new plants begin to form at the ends of the runners each time I cultivate, I keep a little farther away from the plants, always going in the same direction — down one row and back in the other. This throws a little dirt each time toward the plants and aids them in taking root. It is important to get the new plants to root as early in the season as possible so that they will have plenty of time in which to store up plant food for a big crop of berries.

I do not let the mother plants bear any fruit the year they are set out, as this would tend to exhaust the vitality of the plants and cause many of them to die and others to make but a feeble growth. If a dairyman wants to produce a good milch cow he endeavors to guard against the animal's receiving a check to growth at any time from calfhood to time of freshening. So a fruit-grower should guard against any check to the best growth of his plants. If the plants are bothered by the white grub, I know of no better method of control than to go carefully over the field as occasion requires and note the plants which are wilted. By digging them up you can generally find the grub within 3 to 5 inches of the plant — sometimes actually eating the roots. By getting the grub you prevent its going to the next plant. I have known of a grub taking five adjacent plants before it was caught and destroyed.

I aim to go over the berry fields just before mulching and take out any of the biennial weeds which may have started in the fall. This class of weeds such as catnip, wild carrot, evening primrose, ox-eye-daisy, mallow and others will grow in a very low temperature and if not removed will make effective robbers in the fields by taking up sunlight, plant food and moisture.

The fields should be mulched with coarse manure or straw about an inch deep just before winter sets in, as a protection against alternate freezing and thawing, which if not prevented would tear the roots and lift the plants more or less out of the ground. When the ground is settled in the spring I rake the coarser portions of the mulch into rows and draw it on ground to be plowed for potatoes, or else pile it for use the following fall. I do not cultivate the fields the year they are to fruit. Any advantage that might come would be offset by having dirty fruit every time it rained.

In harvesting the fruit I find that women and girls make the best pickers. They are generally careful and good workers. The "smart" boy in the berry patch is like a thistle in the finger. I have just one rule for the berry pickers to follow: "Put no berries into the box that you would not wish to buy — and fill the box." I use the 32-quart crate, buying them of the merchants who handle the berries sent north by the southern growers before the home-grown berries are on the market. You can usually obtain these empty crates for 10 to 15 cents each. If you bought them new of the manufacturer they would cost you 40 to 60 cents each. Standard quart baskets will cost you $3 per case of one thousand. Always pick your berries in new baskets; use any baskets you may have returned in transplanting tomato and other garden plants.

I find it best to arrange sales with only one dealer in each of the villages where I market the berries. I do not have the time or the help to peddle. This method, however, brings the best prices and should be practiced where possible. I usually take a number of orders from farmers for bushel crates of berries for canning, and when there seems to be an over-supply of berries on the markets I fill these local orders and thus help relieve the depressed trade with the dealers. I run short reading notices in the local papers during the month of fruiting, stating that, "Katkamier's strawberries are for sale at Osburn's market."

When your berries have been harvested, plow over the fields, harrow lightly but thoroughly and sow to buckwheat, fodder corn, turnips or plant to early cabbage, early potatoes or wax-podded string beans. By never having an old bed of strawberries you will avoid insect pests and fungous diseases. A new plantation set out each spring is the best rule to follow.

I find that string beans are the most profitable special crop I can grow after a strawberry field has been turned over. If they are planted before July 8 or 10, they will yield a profit of $50 to $75 per acre. I use the Burpee's white wax, Davis white wax and Wardwell's kidney wax, the latter variety being the best as it matures a little earlier than the others and has long, thick, tender pods.

The canners will usually buy the fresh pods of these varieties at $35 to $45 per ton. It happens some years that the canners can not use the pods. In that event the beans will ripen before frost and the dry beans can be sold to the seedsmen at a price always greater than that received for commercial beans. I have received as high as $5 per bushel wholesale for string bean seed. Care should be used in threshing the ripe string beans as the pods are somewhat tougher to open than field varieties.

Rows are marked 32 inches wide and five beans placed in the row every 16 inches, an inch deep in the soil, with an ordinary hand corn planter. The beans are always planted at the right side of each mark. As soon as they are an inch high I start the cultivator, first going close to the left side of the bean row. This fills the little depression left by the teeth of the marker, and by returning on the right side of the row you can cover up all the little weed seedlings which may have started. One cultivation twice in the row and two cultivations once in a row will usually be sufficient.

You now have my views on some of the special farm crops and my methods of handling them. I have made them pay. In your locality and with your soil you can select such special crops as seem to be wanted and by studying them you can grow them successfully, thus doubling your present income. Others are doing it and so can you. It all comes of thinking and working.

Home Sanitation

By Ellis M. Santee, M.D., Farmers' Institute Lecturer

Did you ever visit a friend, who took you all around among his fine barns and showed you how well he was prepared to care for his hogs, his cows, his horses and even his chickens? And then did he take you into the house and show you the rooms of his children and the conveniences for the wife and mother? Not often. More often, had you taken the trouble to look, you would have found no ventilation, no kitchen-sinks, no bath room, no convenient water supply. How often you would find an insanitary outhouse, on a shallow, open vault; the well outside the house and perhaps near the closet; a foul-smelling slop-hole near the kitchen door; and, if you stayed to dinner, you would notice Mother quietly slip out the back door and split the wood for getting the dinner. Is it any wonder that nearly everywhere we go we are asked how to keep the boys and girls on the farm? What effect must it have upon John and Mary to lie awake nights and wonder whether Father takes better care of the stock because there are dollars in it?

Do you know that in this state, last year, in spite of our pure air, good food, abundant exercise and the joy of living near to mother earth and nature's heart, there were almost as many deaths per thousand of population in the country as in the city? In fact, there was a gain of only 4 lives in every 10,000 people. Why, there were more deaths (nearly 4 to 1) of infants under two years of age, in the country than there were from old age; and, although the cities outnumber us 2½ to 1, there were some infectious diseases that caused more deaths in the country than they did in the cities. There were more deaths in the state last year from preventable diseases than there were deaths of soldiers from this state in battle, during the entire Civil War. We shudder when we contemplate the one, and the other we call a "Dispensation of Providence." Rather call it a crime.

I believe that the time will come when we will be paying our physicians to keep us well, rather than to drug us when we are ill. Our life and health depend, primarily, upon: (1) the air we breath; (2) the water we drink; (3) keeping out the seeds of disease. The latter depends much upon the two former, and all upon the disposition we make of the wastes from our bodies.

The foundation of all study of sanitation is a knowledge of the germ. Germs, bacteria, baccilli, microbes, all mean the same thing. The germ is the seed from which grows all contagious and infectious disease, just as wheat, corn or oats grow from their seed, and you can no more get typhoid fever from diphtheria or any other seed than you can raise wheat from planting corn. The seeds of disease depend upon the same three things for their development as do the seeds which we sow in the soil — heat, moisture and nutriment. In studying our farm crops the problem is to save the seed, plant it, and nourish and care for the crop. Our sanitary problem is just the opposite. Kill the seed, avoid planting it, or kill the growing crop.

Unfortunately, we can not always destroy all of the seed, and some of it is planted by each one of us nearly every day. When this is done, there is a wise provision of nature in what are known as phagocytes, or watch-dogs, or soldiers, scattered around more or less abundantly in the blood. A larger or smaller number of these soldiers constitute, in great part, what is known as vitality. While these soldiers are not animal in their nature, they do have the power of locomotion. They never sleep, but are constantly on guard, like good soldiers, and when a foe appears each one in the vicinity makes a bee line for the enemy, in an effort to destroy him. If there are soldiers enough to win the battle, health remains; otherwise disease ensues.

These seeds of disease are vegetable in their nature, and are so small that a million of them may comfortably live in one drop of water without visible crowding. Their danger lies in their size, being visible only through a microscope, and the rapidity with which they grow and reproduce themselves. Under favorable conditions, one will in less than half an hour swell up, break into two full-grown germs, each ready to begin feeding on its surroundings and to make, in the same short time, two more so that one may develop into over a million in a little over five hours.

Our bodies are made up of myriads of minute bodies, each of which may be likened to a citizen of a city, who has to have the grocery boy, the meat market boy, etc., bring him supplies each day; he also has to have the garbage man carry off the waste. So the supplies have to be taken to each one of the little bodies that make up our visible bodies and the wastes have also to be taken away from them. This necessitates two systems of canals and a sewer system. To keep all of these in good working order they must have an abundance of pure water. Therefore, one of the first and most important things to consider in selecting a site for a home is a good water supply.

In the old days a spring in a virgin forest was an ideal source of family water supply, and this state was and is well supplied with springs; but a spring is as good as its surroundings and a well is as good as its protection. So, as we become crowded closer together, our fine springs are coming to have more elements of danger. Remember that spring water is more or less surface water and the surface should be protected as far as it may drain into the spring through the soil. A spring should always be protected against water running into it at the surface. This is so easily done with concrete. You need not dip the water out, but simply dig out a hole about a foot larger than your spring is to be. Make a box the size that you want the spring, put it in the spring and weight it down. Then mix your cement and gravel about 1 to 6 and pour it around the box, dry. It will soon harden under water. By running a shingle down along the box, next to the concrete, you can crowd the coarse gravel back and make the concrete smooth, for you cannot plaster it after it dries, as you can a dry wall. Build the wall at least a foot above the surrounding surface. Be sure that your overflow is higher at the inlet than at the outlet, as otherwise a scum will form upon the water. When we examined several hundreds of springs on the farms of Maryland and Virginia, a very small percentage of them were properly protected and, as I now remember it, 43 per cent. of them were dangerously contaminated.

The best source of a water supply in most places is a deep well. Not always so, however, for the worst well I ever examined was 300 feet deep and most of it through rock. We proved conclusively that it was contaminated by a privy vault about 200 feet away. There probably was a seam in the rock which dipped from the vault in the direction of the well, and it would have been no worse had there been a tile drain laid from near the vault to the well. Other bored wells are ruined by not being properly cased. The casing should fit tight in the rock. The worst wells we find are the dug ones that are walled up with loose stone, not high enough to turn the surface water, and then covered with loose planks which soon shrink and leave great cracks between. If you have such a well, as soon as you can get the material together, clean it out, dig away the soil down to solid earth, and then lay up the wall in concrete. Make it at least 18 inches higher than the surface, grading it off so as to carry the surface water away from rather than into it. Then make a concrete slab to cover the well. Make it 4 inches thick, reinforced by burying some old iron or iron pipe in it as you make it. Put these pipes about 8 inches apart. It is easy to make the hole for the pump and for a ventilating pipe. This pipe should have a cap over the top of it to keep things out.

Some one has said that "trusting in providence and the old oaken bucket sounds well in poetry, but is not hygiene." There are many ways of getting the water to a tank that is high enough to give running water in all of the buildings, but the hot air and gasoline engine seem to be the favorites at this time. I hope to see the time when denatured alcohol, made from the wastes from the farm, will be doing the work.

There are two ways of getting supplies to each of our little bodies and getting the wastes away. The solids are floated in or out, while the gases are carried with the air.

We are so constituted that we must have oxygen for two purposes at least: (1) to burn up with certain elements of our food to keep us warm; and (2) to act as a purifying agent. In nature we get all of this oxygen from the air we breathe. It goes into the lungs which are a wonderful piece of machinery, a sort of chemical laboratory, if you please. Here it is traded for another gas, known as carbon dioxide, a gas that is poison to us, but is needed by the plant, so it is sent out to the plants and they in turn take it, rejecting oxygen which we need. If you were to start a fire in your stove and give it no draft your fire would go out, and if your draft were made up entirely of foul air you would have a poor fire for the same reason that you must have pure air to be healthy.

It is said that each one of us who weighs 150 pounds needs the available oxygen of about 3,000 cubic feet of air per hour, so you can see how necessary it is that our homes be well ventilated, especially our sleeping rooms, which we occupy at a time when outside doors are not being frequently opened. In the good old days when we had fire places in our homes we had fairly good ventilation. Even a good stove will do wonders if given a chance and a hot air furnace will give us a lot of pure air if it is not burned up before it gets to the living rooms. The modern system of heating by hot water or steam has made some additional system of ventilation an absolute necessity.

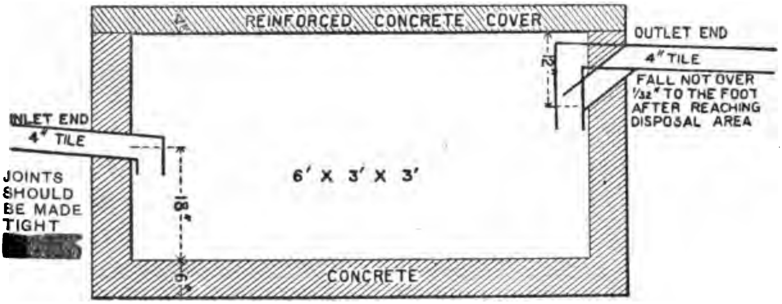
Good ventilation is fresh air without drafts and I know of no system which will give you greater satisfaction than a simple piece of cheap muslin, stretched on a frame that just fits the window. This will give you pure air in cold weather without making your room too cold, as it will be if the window is simply opened. You can sit down by a window thus covered without feeling a draft and without danger of taking cold. This system of ventilation will give you perfect satisfaction if used in any of the buildings in which your stock is housed. For stock it requires about 2 square feet of muslin for each thousand pounds of animal, for people about the same amount for each grown person. For the schoolhouse, the living room or the sleeping room, a very convenient and satisfactory way is to make a frame that will just fit under the lower sash when it is raised, saw it in two, vertically, and put hinges on where it was sawed. This, when covered with the muslin folds, can easily be removed from the window, so that it may do duty in the living room during the day and in the sleeping room at night. This kind of ventilation will surprise you in many ways, not the least being the fact that no trouble will arise from rain beating through the muslin. I have used this method in my own home for many years and know a large number of people who have also used it. Last year, when the New Paltz Normal buildings burned and the school was quartered about in all sorts of places, Dr. Scudder used muslin for ventilation and he told me the results were not only perfectly satisfactory but astonishing — good air, no drafts, no colds. Try it; you will never be convinced until you do.

The greatest source of supply of seeds of disease is from the wastes from our bodies and the greatest vehicle for carrying them to us is the common house fly who delights in filth and never takes a foot bath after wallowing around in it until it comes to some liquid food. The house fly seldom gets very far from the place where it was born. Therefore, if we were to cover up all filth around the home, or get it away from the buildings each day, there would soon be no flies; but that is asking more than we can expect. So I am going to ask you to get rid of that old cold, unsightly, ill-smelling, disease-harboring outhouse and replace it by a bath room with modern appliances. There is no reason why you should not have it. Costs something? Yes, but it is cheaper than doctors and undertakers, and it does not cost so much, after all. Many of you have been detained by the fact that you have no stream into which to empty the sewage. That is entirely unnecessary and, besides, it is now illegal for even a private family to empty sewage into any stream in this state. A proper cesspool will be better and cost less. Do not be deterred because some scientific fellow has called what you want an anaerobic tank or a septic tank. It is really nothing but a plain, everyday cesspool and anyone who has sense enough to pile one stone above another can make it. The secret of success lies in how the sewage goes in and how the effluent or clear water goes out.

The smallest one that I would advise building is 3 feet wide, 3 feet deep and 6 feet long. The sewage should come in at the end and the pipe should be 4-inch sewer tile, with an elbow just inside the tank, turning down to within 18 inches of the bottom of the tank. This keeps the fresh sewage from flowing immediately toward the opposite end, where the outlet is. This outlet should be a pipe about 4 inches in diameter, which is tilted downward on the inside so that the outer end is about 12 inches higher than the top of the tank. This is just opposite to the way I told you to have the outlet to your spring and for the same reason. In a tank of this kind, if it is working right, there will always be a scum on the surface. This scum is working for you while you sleep. In this way all solid matter in the sewage is liquified and nearly all the seeds of disease are destroyed. The water that comes from this kind of a cesspool is almost as clear as the well water.

Provide a load of field stone, not too large, a load of gravel, not too coarse, 5 sacks of cement and a box the right length for the family, 3 feet wide and 3 feet long, with no bottom, and tile according to the distance away from the house. Dig a pit at least 4 feet deep, 4 feet, 4 inches wide and 16 inches longer than the box. The depth should vary according to length of fall between the house and the disposal field, where the loose-jointed pipe is to be located.

Mix ½ bushel of cement with 3 bushels of gravel. Be sure there are no streaks in it when mixed. Then add enough water to make a rather thin paste. Mix thoroughly again, and, after placing a layer of stone in the bottom of the pit, throw in the concrete and level off. Let stand until the next morning and place the box an equal distance from each bank of the pit. Cut holes in each end of the box for inlet and outlet pipes, and place these pipes in position.


4"
REINFORCED CONCRETE COVER
OUTLET END
4" TILE
12"
FALL NOT OVER 1/32" TO THE FOOT AFTER REACHING DISPOSAL AREA
INLET END
4" TILE
JOINTS SHOULD BE MADE TIGHT
18"
6' X 3' X 3'
6"
CONCRETE

Septic Tank for Family of Six or Less.

Put in a layer of stone around the outside of the box, and then a layer of concrete, mixed as before. Alternate stone and concrete until the top of the box is reached, the last layer being concrete, so that it may be stroked off level with the top of the box. Put the stone back from the box and use a spade or shingle as in the spring, so that the inside may be smooth. The top may be covered with plank or a concrete slab. The latter costs no more and is permanent. To make this slab make a box the size of the outside of the tank and 4 inches deep. Put in about 1 inch in depth of concrete, made as before; lay in old pipe or old iron of any kind about 8 inches apart and extending nearly across the box. Then fill up with concrete and stroke off level with the edge of the box.

The outlet pipe should dip down, so that the inner end is 12 inches below the top of the tank, and the outer end should be only about 1 inch below the top of the tank. This tank may be located anywhere outside of the cellar wall where the fall may be had. The water from it has to be run into a loose-jointed pipe about 8 feet long for each person in the family, unless the soil be heavy clay when the length should be doubled. It should be laid in a ditch 12 inches deep. This pipe should be at least 3 inches in diameter, and larger is better. It should have a fall of about 1/32-inch to the foot, and may be located anywhere the soil is loose. A vegetable garden or a lawn is ideal for it. It should be connected with the overflow pipe by tight-jointed sewer pipe that has a fall of not less than 1/16-inch to the foot.

After the concrete is thoroughly dry remove the box from the pit, wet the inside walls and floor, mix some clear cement and water to the consistency of batter, and, with a trowel, smooth up the inside with this mortar; then take an old whitewash brush and put on a wash made of clear cement and water about like thin cream. This will make the inside smooth and water-tight. Place the cover on, connect to the house plumbing and the loose-jointed pipe in the 12-inch ditch to the overflow pipe; cover all and allow the sewage from all parts of the house to flow in.

Do not add disinfectants; they will stop the action that is so necessary to success. This tank will not have to be cleaned, as all solid matter is destroyed except the mineral portion, which is so small in farm sewage that it would not amount to ½-inch in depth in a year.

A complete inside plumbing will cost from $100 to $125 according to the distance from kitchen, height of house and how much you help the plumber in putting it in.

Some Duties of a Patron of Husbandry

By Mrs. S. N. Judd, Farmers' Institute Lecturer

Nearly fifty years ago the farmers of America, especially of the United States, were in an unsettled and troublous condition, and President Johnson, wishing to know by what means the interests of these restless farmers could best be reached, selected a clerk from the Agricultural Department at Washington to travel through the southern states to learn if possible their needs. This man was O. H. Kelley, a farmer from Minnesota, and a Mason, a fact pertinent to the results. While he travelled among them there was borne in upon him the thought that an organization which would bind these farmers together by the "strong and faithful ties of agriculture" was just what they most needed. As he journeyed, he kept up a correspondence with his niece, Caroline A. Hall, and in reply to one of his letters she said: "Do not forget the farmer's wife and daughter," and that is the reason, sisters, we are admitted to a secret organization to-day, with the right to every office, and the right of franchise. I know of no other organization of which this can be said.

When Mr. Kelley returned to Washington he imparted his partially formed idea to his friend, Mr. Saunders, who at once seized upon it. These two consulted with five other men, in other departments. They were sons of farmers and, therefore, interested in the work. Nearly a year later a platform was proclaimed, broad in its outlook, simple in its language, couched in plain Anglo-Saxon that all men could understand. A fraternal order was built upon it and an appeal made to all men to receive it upon its merits. That appeal still stands and after the lapse of nearly half a century not a man or woman can be found who can say: "I have weighed it in the balance and found it wanting."

Let us for a moment speak of these pioneer grangers, for we have them everywhere, north and south, east and west, in Canada and out in the island of Australia. They were thinking men and women whose influence extended far and carried conviction with it. We do not understand how one mind acts upon another, but we do know that just so surely as a stronger body moves a weaker one, just so surely a strong mind influences a weaker mind.

I have said that these pioneer grangers formed a platform for this order. This platform has several planks, the first being, "We propose meeting together." Now, to the people outside of this order or to those living in large towns or cities this might seem a simple thought — that we meet together. But to those living in country districts, out upon farms, at some distance from each other, the idea is a beneficent one, especially so to the women of the farm. Our fathers, husbands, brothers and sons are called away from home by the exigencies of business. They go to the town, to the factory; they meet other men, touch elbows with them and get new ideas and thoughts, new inspiration for the work before them, while we remain more closely at home. It has been said that a farmer's wife's life consisted of, "Get breakfast, get dinner, get supper, go to bed." If this were ever a fact, it is no longer true. We have added, "Go to grange."

The second plank is, "We propose talking together," and again, would this seem a useless instruction. But let us hark back to the farms. We find the woman of the house, after the children are away at school, going about the work alone and silently. The man of the farm is out on the field, going about his work without talking much. So long has this condition prevailed that we have become a quiet, rather self-distrustful race; hence the command for us to talk when we have met together that conversation may not become a lost art.

The third plank is, "We propose buying together." A great many granges have taken advantage of this plank and have, in connection with the grange halls, stores where patrons may obtain supplies at each grange meeting, saving for themselves and families quite a percentage. I have in mind at this moment a store in the city of Herkimer. The grangers there have banded together and built a block. The first floor is used for the stores. On the next floor is the grange hall and some rented rooms. Reports show that 7 and 8 per cent. is realized on this investment.

On Black Lake, in St. Lawrence County, is Edwardsville grange which has a store on the first floor of its hall and does a business of some $4,000 a year. It is 18 miles from Ogdensburg, a large market place. Right here at a cross-roads it was estimated that 25 per cent. was saved to the members. That means a saving of $1,000 to that community. Any man would consider 7 per cent. a gilt edged investment, 5 per cent. he would be glad to take, and 2 per cent. he does take in the banks. Then the saving of these amounts is a desirable feature of the order.

The fourth plank is, "We propose selling together." Grangers have not taken advantage of this feature of the order as much as they could, nor, perhaps, as much as they should. There is a society in the West known as the "Society of Equity," which is trying to bind the farmers together, to hold grains, their principal product, until they shall receive a fair remuneration. This society is creeping into the East. There are two or three subordinate bodies in Oneida County and as many in Seneca County. Eastern products being perishable cannot be held to such an extent as Western products which are non-perishable. Still, in the opinion of careful thinkers, the market price could be controlled to some extent. This means less to the middleman. Some matrons of husbandry who have not sufficient poultry and eggs to ship individually have brought these to the grange halls, crated them and shipped them to Boston or New York, receiving on eggs from 2 to 8 cents more a dozen than at the local market, according to the time of year, less in the spring, more in fall and winter. Poultry realized from 6 to 10 cents a pound above local prices, and even more at the time of Jewish holidays. Here is the opportunity; we can accept it if we choose.

The fifth and last plank is, "We propose, in general, acting together for our mutual good and improvement as occasion may require." Surely, this is broad enough and strong enough for any society of the agricultural world. It was the work of the grange that secured a cabinet position for agriculture, placing in the highest council of the nation a representative of the greatest and most important industry. It has established agricultural colleges, experiment stations, laws for the formation of farm insurance companies, and the Dairy Commission Law. It has established libraries, reading rooms, banks and other coöperative enterprises and practically founded rural free delivery.

I suppose every Republican in this room is looking aghast at this last statement, but wait a minute. In the year previous to the establishment of the R. F. D., Mortimer Whitehead, then lecturer of the national grange, presented a resolution to that body, asking that a committee be appointed to go before the proper authorities at Washington to ask for an appropriation for the establishment of such routes, and the national body turned him and his resolution down. But he was of a buoyant, hopeful disposition and the next year he came up just as serenely with the same resolution. It was carried. A committee was appointed, went to Washington and secured the paltry sum of $5,000. A few R. F. D. routes were started in places where it was thought they would be the least acceptable but, strange to say, they took like wild fire and from this beginning has come the network of free delivery throughout the land, which brings so much happiness to the farmer and his family.

These pioneer grangers, believing kindly and intelligent social intercourse between its various members would produce an organization bordering on the ideal, searched for the underlying laws, and taught us that human beings, to be companionable, must have the same interests, the same pleasures, the same benefits, the same happiness and the same social duties. We, as patrons of husbandry, are not contending with sharp contrasts of wealth, or culture, or pleasure but share the same material and intellectual existence. Our labors, our pastimes, our sympathies are identical.

Intimately associated we recognize certain duties which we owe one to the other. These come under the head of "Duties to Mankind," and are subdivided into "Personal Duties," and "Relative Duties." The first duty, a personal duty is, "Secure a complete self-development." Here is where the work of the lecturer comes in. Whenever a candidate is admitted to the order, this officer will at once proceed, as it were, to feel the mental pulse of the new member, find that in which he is interested, to what he is adapted and set him at work along these lines, for we are instructed to encourage this collective body to become readers, writers, thinkers, and speakers. Indeed, the grange has been called a "Community

College," which strives to compensate for neglected opportunities in early life.

And if, by encouragement of this society, men and women become able to think when upon their feet and at the same time to express themselves clearly and concisely both in its meetings and in any assembly outside the grange hall, then is it fully compensated. If these same men and women learn the rules of parliamentary law, learn to know their rights upon the floor and demand them, or even to put a motion, an amendment to a motion, an amendment to an amendment to a motion, and do it as it should be done, then are *they* fully compensated.

We pass now from the realm of personal duties to "Relative Duties." The first of these is self-control, governed by the maxim, "Bear and forbear." This means patience under differences of opinion and a courtesy that refrains from retort under provocation. *To refrain from retort under provocation* is a pretty hard thing to learn. Coming as we do from a life which is approximately independent, the training received from this one virtue is of inestimable value.

Then comes the duty of kindness, known under the comprehensive law, "Do good to all men as ye have opportunity." Says Dr. Holland: "The world is full of kindness that has never been spoken, and that is not much better than no kindness at all." For example, the fuel in the stove makes the room warm but there are great piles of fallen trees lying on rocks, and on top of hills where nobody can get at them. These do not make anybody warm. We might freeze to death for want of wood in plain sight of these fallen trees if we had no means of getting the wood home and making a fire of it. There are homes where never a word of affection is spoken by one member of the family to another. They seem to be bound in a coat of conservatism. They are kind. They really are kind, but it is necessary to break through this crust in order to know it. The house will seem cool even in summer and if you live there you will envy the dog when anyone calls him "Poor fellow." And so this grange of ours is a means of breaking down the conservatism of its members and making them kinder to each other.

No one can live absolutely independently of others. We must be continually receiving something from the community in which we dwell, either as individuals or collectively. We are bound together by mutual wants and interests and no one may say of another, "I have no need of thee." It is imperative that we do good to others as an acknowledgment of the good that has been done to us. And we do this not as a matter of justice, but as one of the ways of showing kindness.

Honesty is inculcated. Many a poor man has been left in want when the honest debt paid would have relieved suffering, and many a wealthy man has been put to great inconvenience because the service paid for was not rendered. We may be in debt for many things, for money for barter, kind words or kind deeds. A sympathizing look or word may have most touchingly obliged us and the law requires that we repay the good deed by other good deeds in return. Sustain your neighbor's good name. In point of fact, personal dishonor does not come except by one's own deeds. Yet our true character may be belied and our good reputation tarnished by no fault of our own. This may be effected by direct declaration, by equivocation, by delusive signs or gestures or by utter silence where truth demands positive assertion or denial.

Charity is inculcated. Charity implies a universal good will. It rejoices when others are made happy through its instrumentality. It may not always approve of the moral character or conduct of the person it assists; yet it regards them as human beings with like powers of suffering and like needs of relief, and relieves so far as it may.

Under this head we might add "Give to the poor." And let us remember the poor are not only those who have little or nothing of this world's goods, but all or any that are in want. "The rich in money may in many cases be far poorer, have more distressing wants than he who begs from door to door. If there is any human want we know and knowing can relieve, *there* the maxim applies." We must not only wish relief but perform the act which gives relief. A man may say, "Be ye warmed and be ye filled" and truly wish it and yet himself not give anything to accomplish it. This would not be giving to the poor.

We believe in the twin duties of hopefulness and cheerfulness.

Did you ever rise in the morning feeling as if a great black pall had settled down over the world? Presently you go out on the street, meet a friend who greets you with a pleasant smile and cheerful word and you feel the burden wonderfully lightened. The clouds break away, the sun shines again and all things resume their normal condition. It is a blessed thing to speak a cheerful word when you can. It is the one with the pleasant words on her lips to whom the stranger turns for direction or advice. Her manner has inspired confidence and trust. We may find it hard to speak the pleasant word when a burden rests upon our own hearts but nothing lightens the spirits like doing good to another.

Above all, enjoy as you go. Some people mean to take their enjoyment in middle life when the hard work is done, or when the children are grown up, or when they get rich, or when the farm is paid for. These people might just about as well give up having a good time. The season of delight so longed for rarely ever comes. The great pleasures of life come to but few and those who receive them tell us that the quiet, peaceful joys that lie all about us are infinitely better. Those of you who have read "David Harum" will remember where, speaking of this same subject, he says, "If I had my life to live over again, knowin' what I do now, I'd do different in a number of ways. I often think of what Andy Brown used to say. Andy was a curious kind of a customer 't I used to know up to Syrchester. He liked good things, Andy did, an' didn't scrimp himself when they was to be had. He used to say, 'Boys, whenever you git holt of a ten-dollar note you want to git it *into* ye or *onto* ye jest's quick's you kin. We're here today an' gone tomorrer' he'd say.

"'T any rate," David added, with unexpected philosophy, "'s I look back, it ain't the money 't I've spent for the good times 't I've had 't I regret, it's the good times 't I might 's well 've had an' didn't."

We believe that after our duty to God the duty to Home takes precedence of all others. We are laboring for more modest homes, where the old fashioned virtues of thrift, economy, the laying by for a rainy day shall be practiced, for the simplicity of the times when the grandmothers of this generation did their own spinning and knitting and the daughters of the household were proud to wait at table. "The influence of such a home," says Elizabeth McCracken, "thrice blessed in mother and father, brother and sister, shall reach from the fireside to the counting house, from the counting house to the asylum and the hospital and somehow find its way back again to the hearthstone by the way of the schoolhouse and the house of God."

My friends, I can in no better way sum up the duties of a Patron of Husbandry, than to say to you that a good patron places faith in God always, nurtures hopefulness and cheerfulness, dispenses charity to the needy, and is noted for fidelity to home and to family. These are the principles of the plain farmer folks, unlettered if you will, but marking a path through this generation lustrous with right doing. Up through the veins of these people the evil has worked as into the stalks of plants, the trunks of trees, and that keen, thrilling sap of the earth, that vitality of the exhaustless mother, that never goes for nothing, has produced one flower at least, an order unspoiled and morally sublime.

And now, in closing, there is a little legend connected with the formation of this order, so pretty and so sweet I would like to leave it with you.

When the yellow harvest was ripe two brothers reaped in the fields together. The east side belonged to one brother, the west side to the other. When the labors of the day were ended and the wheat all garnered into sheaves, they turned their steps homeward. One went by the lower road, the other took the path up the hill. As he neared his cottage door, he saw his wife standing on the doorstone watching his return. She came down the path to meet him, a child on either side and one, the little girl, ran and sprang into the father's arms.

After the evening meal, tired with his day's labor, he laid himself down upon his bed and slept, and sleeping, he dreamed. He saw his brother lying uncared for upon his lonely bed, for he had no wife or child. Waking, he said, "I will arise and go to the field and take a part of my sheaves and bear them to the other side, that when my brother comes again he may know *I love him.*"

The other brother slept. Sleeping, he dreamed that his brother's son lay sick and dying. He saw the slow tears course down the father's cheek and he heard the anguished weeping of the mother. Waking, he said, "I will arise and go to the field and take a part of my sheaves and bear them to the other side, that when my brother comes again he may know *I love him.*"

And there, at midnight, when the moon was hanging high, the two brothers met in the center of the field, each with sheaves of wheat in his arms to bear to the other side. Clasping hands, they knelt down and thanked God for brotherly love and registered a vow to work for the up-building of a fraternal order to be called the Patrons of Husbandry.

INDEX

A.

Agricultural conditions, before establishment of farmers' institutes, 56, 57.
    effect of farmers' institutes upon, 57–59.
Agricultural Education, Social Phases of, Boothe C. Davis, 63–68.
Agricultural schools, 59.
Alfalfa, demonstration work with, 11.
Animal husbandry, necessity of, 122, 123.
Animals, Farm, Feeding of, D. P. Witter, 102–107.
Apple trees, budding of, 150, 151.
    cultivation of, 151, 152.
    planting of, 149, 150.
    selection of, 150.
    setting of, 151.
    trimming of, 152.
Appropriation for farmers' institutes, 59.
Arsenate of lead, 156, 157.
Association, Cow Testing, 111.
Attendance at farmers' institutes, 11, 12, 59.

B.

Babcock test, 111.
Beans, string, as a special crop, 173, 174.
Bee-keepers' institutes, table for, 24.
    recapitulation for, 26, 27.
Blight in potato cultivation, 145–147.
Bordeaux mixture, spraying with, 157–159.
Breeding of swine, 127–130.
Breeds, dairy, 112.
Brodhead, C. W., V. D., Care of the Feet and Teeth of the Horse, 113–119.
Budding apple trees, 150, 151.
Bulletins, slip for ordering, 41.
Butter, Milk and Cheese, Food Value of, Laura Rose, 131–135.
Buttermilk as a food, 133.

C.

Cabbage as a special crop, 166–168.
Carbohydrates, 103, 104.
Care of the Feet and Teeth of the Horse, C. W. Brodhead, V. D., 113–119.
Cesspool, construction of, 180–182.
Cheese as a food, 134, 135.
Cheese, Butter and Milk, Food Value of, Laura Rose, 131–135.
Codling moth, spraying for, 157.
Colorado potato beetle, 144.
Conductors, institute, 28.
Conductor's report blank, 40.
Conference report blank, 31, 32.
Conferences, county, 9, 53.
Converse, J. F., work of, 50, 51.
Cooperative institutes, 10.
    table for, 25.
Corn as a special crop, 166.
Correspondent, local, report blank of, 40, 41.
Counties, arrangement of institutes by, 27.
County conferences, 9, 53.
Cow, Profitable, The, John A. Ennis, 108–112.
    unprofitable, effect of, 108, 109.
        methods of detecting, 110, 111.
Cow Testing Association, 111.
Cream as a food, 132, 133.
Crop yields, average ten-year, 73.
    average value per acre of, 73, 74.
    comparison of, in New York and Illinois, 72.
    decreasing, 72.

Farm Crops, Special, A. B. Katkamier, 166–174.
Cultural system in care of orchard, 154, 155.
Currant worm, spraying for, 157.
Curtis, John G., The Value of Soil Humus, 87–90.

D.

Dairy breeds, 112.
Dairy products, increase in demand for, 112.
Davis, Boothe C., Social Phases of Agricultural Education, 63–68.
Dawley, F. E., work of, 52.
Day, Charles M., Spraying Mixtures, 156–161.
Disease, seeds of, 176.
Diseases in potato cultivation, 145.
District-county plan, 9, 54.
Ditches, open, 94.
Drain, making of, 99, 100.
  plans for, 97, 98.
  tile for, 94.
Drainage, T. E. Martin, 91–101.
  benefit of, 101.

E.

Earth and soil, distinction between, 88.
Education, Agricultural, Social Phases of, Boothe C. Davis, 63–68.
Elements in plants, 103.
Ennis, John A., The Profitable Cow, 108–112.
Evolution of the horse, 113.

F.

Farm Animals, Feeding, D. P. Witter, 102–107.
Farm Crops, Special, A. B. Katkamier, 166–174.
Farm products, rank of New York State in, 82.
Farmer's Garden, The, John Jeannin, Jr., 162–165.
Farmers' Institutes in New York State, A History of, D. P. Witter, 45–60.
Farms, prices of New York, 77.
Fat as a food, 133, 134.
Feeding Farm Animals, D. P. Witter, 102–107.
Feeding swine, 125–127.
Feeds, patent or mixed, 106.
Feet of the horse, anatomy of, 114–118.
  care of, 113–118.
  crooked, cause of, 113.
    remedy for, 114.
    result of, 114.
Feet and Teeth of the Horse, Care of, C. W. Brodhead, V. D., 113–119.
Fertilizer, for garden, 164, 165.
  in potato cultivation, 141–143.
Fly, house, danger from, 180.
Food, buttermilk as a, 133.
  cheese as a, 134, 135.
  cream as a, 132, 133.
  fat as a, 133, 134.
  milk as a, 131–134.
  skim milk as a, 132, 133.
  sour milk as a, 133.
Food Value of Milk, Butter and Cheese, Laura Rose, 131–135.
Fruit, packing of, 155.
Fruit farm, location for, 148, 149.
Fruit-Growing, Suggestions from a Practical Experience in, Thomas B. Wilson, 148–152.
Fungous diseases, control of, 157–159.

G.

Garden, fertilizer for, 164, 165.
Garden, The Farmer's, John Jeannin, Jr., 162–165.
Gott, Fred E., Pruning and Care of the Orchard, 153–155.
Grange, meeting of people at, 184.
  stores in connection with, 184, 185.
  work of the, 185, 186.

H.

History of Farmers' Institutes in New York State, A, D. P. Witter, 45–60.
Home Sanitation, Ellis M. Santee, M. D., 175–182.
Horse, evolution of, 113.
  feet, anatomy of, 114–118.
    care of, 113–118.
    crooked, cause of, 113.
      remedy for, 114.
      result of, 114.
  interference in, 118.
  teeth, care of, 118, 119.
    defective, result of, 119.
    number of, 118, 119.
Horse, Care of the Feet and Teeth of the, C. W. Brodhead, V. D., 113–119.
House fly, danger from, 180.
Humus, definition of, 87, 88.
  importance of, 87.
Humus, Soil, The Value of, John G. Curtis, 87–90.
Huson, Calvin J., Pork Production, 120–130.

I.

Insects in potato cultivation, 143, 144.
Institute, cooperative, 10.
    table for, 25.
Institute conductors, 28.
Institute schools, 10, 54.
  in connection with public schools, table for, 25.
  program for, 35–39.
  recapitulation for, 26, 27.
  table for, 24.
Institute speakers, list of, 28–31.
Institute work, regular, table for, 18–24.
Institutes, arrangement of, by counties, 27.
  attendance at, 11, 12.
  bee-keepers', table for, 24.
  regular and bee-keepers', recapitulation for, 26–27.
Interfering horse, 118.
Introductory statement, 9–12.

J.

Jeannin, John, Jr., The Farmer's Garden, 162–165.
Judd, Mrs. S. N., Some Duties of a Patron of Husbandry, 183–191.

K.

Katkamier, A. B., Special Farm Crops, 166–174.
Kelley, O. H., work of, 183.

L.

Land Values and Land Prices in the East and in the West, G. F. Warren, 69–83.
  changes in, during the past ten years, 71, 72.
  reasons for decrease in, 71.
  reasons for present conditions in, 70.
"Lap-over" meeting, 10, 51.
Laws Governing the Potato, Edward Van Alstyne, 136–147.
Leaf, potato, preservation of, 143.
Lime-sulphur wash, spraying with, 160, 161.
Local correspondent's report blank, 40, 41.

M.

Mains, 95, 96.
Martin, T. E., Drainage, 91–101.
Meetings, miscellaneous, to which department speakers were sent, 25.
Milk, as a food, 131–134.
Milk, Butter and Cheese, Food Value of, Laura Rose, 131–135.
Milk, skim, as a food, 132, 133.
  sour, as a food, 133
  weighing of, 110.
Milk record, keeping of, 110, 111.
Mineral content of ration for feeding animals, 106, 107.
Miscellaneous meetings to which department speakers were sent, 25.
Miscellaneous tables, 31–41.
Mixed feeds, 106.

N.

New York farms, prices of, 77.
New York products, exceeding one million dollars per year in value, 82, 83.
  statistics of, 79–83.
New York State, rank of, in farm products, 82
Nitrogen, source of, in the soil, 88.
Normal institute, 52.

O.

One-day institute program, 32–34.
Orchard, cultural system in care of, 154, 155.
  spraying of, 155.
Orchard, Pruning and Care of the, Fred E. Gott, 153–155.
Organic matter in soil, 88–90.
Oxygen, necessity of, for human body, 178, 179.

P.

Packing of fruit, 155.
Pasture lands, 75–79.
  cost of, 77–79.
Patent feeds, 106.
Patron of Husbandry, Some Duties of a, Mrs. S. N. Judd, 183–191.
Pearson, R. A., work of, 52–54.
Phosphorus, source of, in the soil, 89.
Pig, profitable, 124.
Plant elements, functions of, 103.
Poison sprays, 156, 157.
Pork Production, Calvin J. Huson, 120–130.
Potassium, source of, in the soil, 89.
Potato, construction of tuber of, 136.
  depth of planting, 140, 141.
  seed for, 138–140.
  soil for, 137, 138.
  water supply for, 136–138.
Potato, Laws Governing the, Edward Van Alstyne, 136–147.
Potato bug, spraying for, 157.
Potato cultivation, blight in, 145–147.
  diseases in, 145.
  fertilizers in, 141–143.
Potato cultivation, insects in, 143, 144.
  scab in, 139, 140.
Potato leaf, preservation of, 143.
Poultry institute, special, table for, 17.
Powell, G. T., work of, 51.
Power sprayer, spraying with, 160, 161.
Practical Experience in Fruit-Growing, Suggestions from a, Thomas B. Wilson, 148–152.
Products, farm, rank of New York State in, 82.
  in which New York State is one of the five leading states, 80–82.
  New York, exceeding one million dollars per year in value, 82, 83.
    statistics of, 79–83.
Profitable Cow, The, John A. Ennis, 108–112.
Program, for first farmers' institute, 47–49.
  institute school, 35–39.
  one-day institute, 32–34.
  two-day institute, 34, 35.
Protein, 104.
Pruning and Care of the Orchard, Fred E. Gott, 153–155.
Public Schools, institute schools in connection with, table for, 25.

R.

Ration, mineral content of, 106, 107.
  for animals, compounding of, 104–106.
Record, milk, keeping of, 110, 111.
Report blank, conductor's, 40.
  conference, 31, 32.
  local correspondent's, 40, 41.
Reporting of farmers' institutes, 50, 51, 54, 55.
Roberts, I. P., work of, 45–49.
Rose, Laura, The Food Value of Milk, Butter and Cheese, 131–135.

S.
Sanitation, Home, Ellis M. Santee, M. D., 175–182.
San José scale, control of, 159.
Santee, Ellis M., M. D., Home Sanitation, 175–182.
Scab in potato cultivation, 139, 140.
Schools, agricultural, 59.
  institute, 54.
    program for, 35–39.
    recapitulation for, 26, 27.
    table, for, 24.
Seed, for potatoes, 138–140.
  for vegetable garden, list of, 164.
Sewage, proper disposal of, 180–182.
Skim milk as a food, 132, 133.
Smith, G. A., work of, 51, 52.
Social Phases of Agricultural Education, Boothe C. Davis, 63–68.
Society of Equity, 185.
Soil, composition of, 91.
  definition of, 87, 88.
  dry, 94.
  ideal, 94.
  for potato, 137, 138.
  organic matter in, 88–90.
  source of nitrogen, phosphorus and potassium in the, 88, 89.
Soil and earth, distinction between, 88.
Soil Humus, the Value of, John G. Curtis, 87–90.
Soil water, 91, 92.
Some Duties of a Patron of Husbandry, Mrs. S. N. Judd, 183–191.
Sour milk as a food, 133.
Sow, importance of, in swine husbandry, 124.
Speakers, at institutes, list of, 28–31.
  department, list of meetings to which sent, 25.
Special crops, cabbage as a, 166–168.
  corn as a, 166.
  strawberries as a, 168–173.
  string beans as a, 173, 174.
Special Farm Crops, A. B. Katkamier, 166–174.
"Sports," removal of, 154.
Spraying, for the codling moth, 157.
  for the currant worm, 157.
  for fungous diseases, 157–159.
Spraying — (*Continued*).
  for the potato bug, 157.
  for sucking insects, 159–161.
  of orchard, 155.
  with Bordeaux mixture, 157–159.
  with lime-sulphur wash, 160, 161.
  with power sprayer, 161.
Spraying Mixtures, Charles M. Day, 156–161.
Sprays, poison, 156, 157.
Spring, protection of, 177.
Statistics for farmers' institutes, 13–41.
  of New York products, 79–83.
Stores, grange, 184, 185.
Strawberries as a special crop, 168–173.
String beans as a special crop, 173, 174.
Suckers, removal of, 154.
Sucking insects, spraying for, 159–161.
Suggestions from a Practical Experience in Fruit-Growing, Thomas B. Wilson, 148–152.
Swine, breeding of, 127–130.
  care of teeth of, 125.
  feeding of, 125–127.
  present status of, 120, 121.
  weaning of, 125, 126.
Swine industry, extent of, 121, 122.
  importance of sow in, 122–124.
  success in, 123–130.

T.
Table, miscellaneous, 31–41.
  showing attendance at bee-keepers institutes, 24.
      cooperative institutes, 25.
      institute schools, 24.
      regular institutes, 15–24.
      special periods for students in public schools, 25.
    average prices of farm lands, 74.
      yields per acre of crops by ten-year periods, 72, 73.
    cost of pasture lands, 76, 78.